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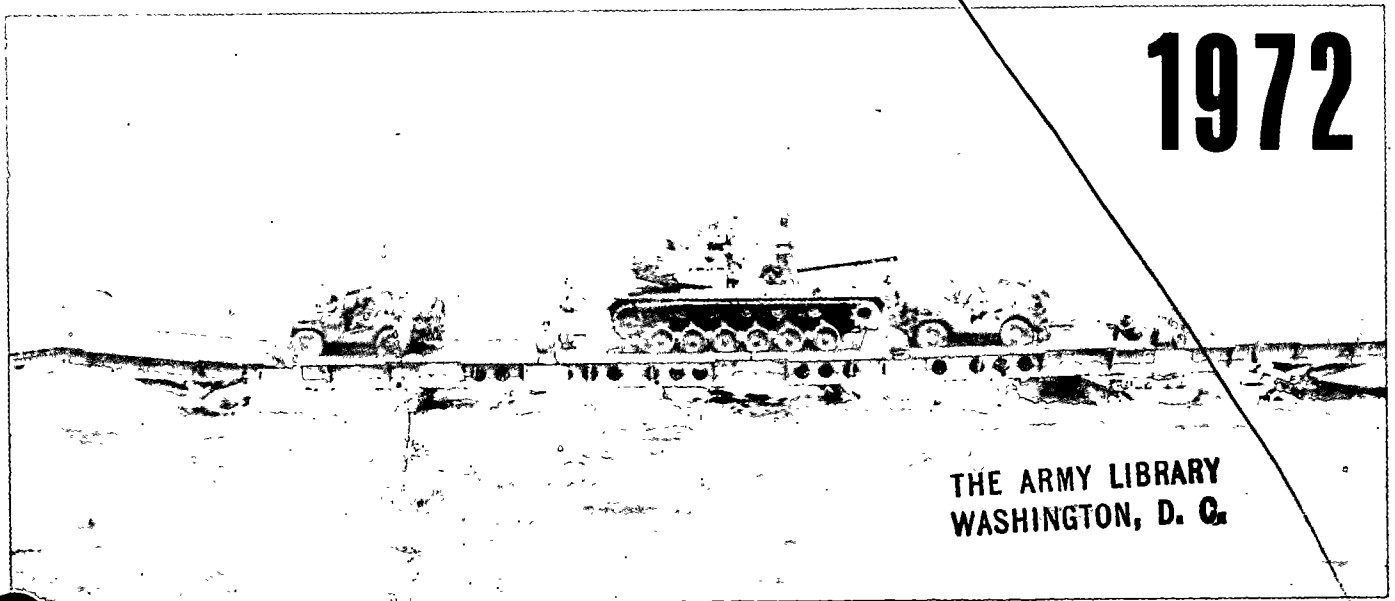
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RIVER-CROSSING OPERATIONS

1972



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MARCH 1972



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Reference

ERRATA SHEET
for
FM 31-60, 27 March 1972

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Innovations Used in This Manual:

This manual has innovations in style and format which are intended to assist in using the manual. A summary of the innovations follows:

a. The preface provides a summation on river-crossing operations for quick reference purposes.

b. Full page printing has replaced the two columns per page that was used in the old manual. This is intended for ease of reading.

c. A recapitulation of doctrine is stated at the end of each chapter, except for chapter 1. This is to emphasize the main points from the chapter, providing a ready reference to the reader.

d. Main points have been highlighted throughout the manual. Examples of these are:

- block format (para 1-5, 1-6, 1-7)
- dots (para 1-5, 1-6) •
- and underlining (para 1-6, 2-2, 4-1).

e. Footnotes are used to reference other field manuals which cover more detail of a subject (para 4-15).

f. The margin index on the rear cover keys major topics to the markers on the edge of the manual. The purpose is to assist in rapidly locating major topics in the text. A detailed index is retained at the rear of the manual.

g. The pre-addressed, tearout card at the last page of this manual is for YOU to comment on the innovations.

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MANUAL.



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PREFACE

This manual sets forth doctrine and techniques for planning and executing tactical river-crossing operations. River crossings are either hasty or deliberate. This doctrine and these techniques apply primarily to deliberate crossings when the crossing force or its assault element must plan for a phased buildup of combat power on the far bank and must have considerable support from higher echelons to overcome the obstacle. This doctrine applies to all levels of command and to all forms of warfare. The mission of planning a river crossing, regardless of the echelon of command, presents many factors for deliberation: selection of the bridgehead, an assessment of the friendly aspects of the operation, the width of the crossing front, how the enemy will conduct his defense, the air situation, whether the crossing will be deliberate or hasty, the buildup of troops within the bridgehead, the type and number of crossing sites available, and the type of formation to be used. These are only a few of the many considerations confronting the planner.

The river-crossing force may be divided into three basic echelons: assault, followup, and rear. Each echelon has its own specific mission and its own peculiar method of employment. Movement plans are prepared to insure the delivery of troops, equipment, and supplies to the right place at the right time and in the best formation and condition to accomplish the mission. Therefore, reliable communications are necessary for continuous coordination and for efficient employment of the large number and variety of supporting units peculiar to this type of operation. Communication planning is continuous and is concurrent with tactical planning.

Special problems in crossing a major river obstacle include these: engineer crossing assets may be limited; the extreme width of the river reduces the number of crossing sites that can be established; and the time for crossing and the vulnerability of the crossing force increase. Retrograde operations over an unfordable river are characterized by detailed planning and centralized control. Under enemy pressure, retrograde operations are characterized by greater reliance on contingency plans and unit standing operating procedures. Friendly forces must be able to reach and cross the river before the enemy does and to prevent his securing or destroying bridges or other crossing means.



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FIELD MANUAL }
No. 31-60

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 27 March 1972

RIVER-CROSSING OPERATIONS

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CHAPTER 1

GENERAL

Section I. INTRODUCTION

1-1. General

This manual is in consonance with the international agreements listed below. Applicable agreements are listed by type of agreement and number at the beginning of each chapter.

<u>TITLE</u>	<u>NATO STANAG</u>	<u>CENTO STANAG</u>	<u>SEATO SEASTAG</u>	<u>ABCA SOLOG</u>
<u>Operation Orders, Annexes to Operation Orders and Administrative/Logistic Orders</u>	2014	2014	2014	17R
<u>Orders to the Demolition Guard Commander and Demolition Firing Party Commander</u>	2017	2017	2017	54
<u>Military Symbols</u> -----	2019	2019	2019	28
<u>Computation of Bridge, Raft, and Vehicle Classifications</u>	2021		2021	45R
<u>Battlefield Illumination</u> -----	2088	2088	----	108

1-2. Operational Environment

River-crossing operations may be required in any environment and under any level of nuclear and chemical weapon usage.

Under conditions of active nuclear or chemical warfare, the crossing of a river generally requires forces and tactics designed to capitalize on the effects of friendly fires. Crossing forces exploit friendly fires to secure crossings before the enemy can react. Electronic countermeasures may be used to deny or degrade enemy communications and electronic acquisition means, thus inhibiting his capability to react.

A crossing operation normally is conducted by one or more divisions as part of a corps operation. The division usually requires higher echelon support, such as crossing equipment, engineer troops, chemical smoke generator units, military police, Army aviation, field artillery, medical, air defense artillery units, and Army Security Agency elements.

In stability operations, additional planning for measures to counter guerrilla tactics, to gain the support of civilians, and to perform independent unit operations is emphasized.

River-crossing operations must emphasize implementation of active and passive air defense means to include use of organic automatic and small-

arms weapons, dispersion, concealment, camouflage, communications security, and night operations.

Section II. DEFINITIONS AND BASIC CONSIDERATIONS

1-3. Definitions

Bridgehead. A bridgehead is an area of ground held or to be gained on the enemy side of a river. The area should accommodate and facilitate maneuver of the forces involved without congestion and should provide sufficient space and adequate terrain to permit defense of the crossing sites. The bridgehead should also provide a base for further operations. (Details on selection of a bridgehead are in para 3-14.)

Bridgehead line. A bridgehead line is the limit of the objective area in the development of the bridgehead. It is an imaginary line drawn around a defined geographical area on the enemy's side of a river that is tied in with the far bank of the river and generally contains defensible terrain.

Crossing force. The crossing force is the overall force involved in the crossing.

Assault forces. The assault forces are the major subordinate elements of the crossing force involved in the assault of the river and the advance on the far bank.

Crossing front. A crossing front is the entire distance along the river in the zone of the crossing force (fig 1-1).

Crossing areas. Crossing areas (fig 1-1) are designated to facilitate controlling the flow of troops, equipment, and supplies to be moved across the river by surface means. A crossing area contains one or more crossing

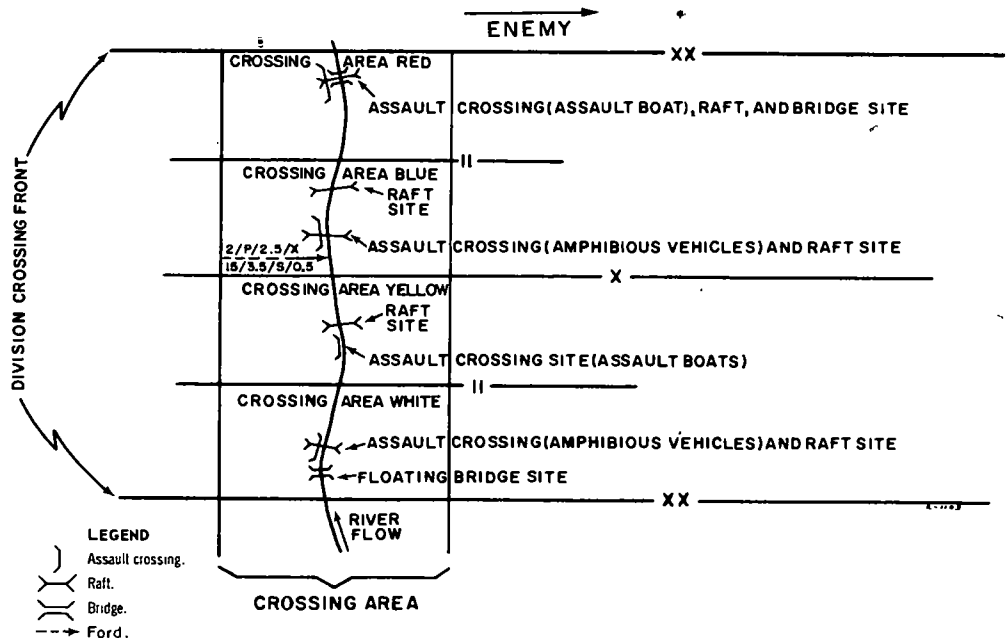


Figure 1-1. Schematic of a division in a river crossing.

sites, space for equipment needed for crossing, and space for dispersal of convoys. Normally, the surrounding terrain that may be subject to the effects of enemy fires concentrated on the crossing sites is included in the crossing area.

Crossing site. A crossing site is the location along the river, where the crossing can be made by using amphibious vehicles, assault boats, rafts, bridges, or fording vehicles (fig 1-1). (Assault crossing site is covered in para 3-8. Tactical and technical criteria for the selection of sites for each of the individual crossing means are contained in para 3-36 through 3-42.)

1-4. Purpose of River-Crossing Operations

The purpose of a river crossing is to move the attacking force across a river obstacle as rapidly and as efficiently as possible so it can continue its attack to destroy the enemy or to secure objectives that will protect the crossing of the remainder of the force.

1-5. Major Problems in River-Crossing Operations

In a river-crossing operation there is a risk of defeat in detail. Keeping this risk within acceptable limits while accomplishing the mission is the fundamental problem in a river crossing. The degree of risk is measured by the difference between the capability of friendly forces to project combat power on the far bank and the capability of the enemy to concentrate against this force.

Potential problems of movement regulation and control that may exist because of restrictions on traffic, communications, land area available, and the involvement of additional units are of special concern in river-crossing operations:

- | | |
|-----------------|---|
| Space. | <ul style="list-style-type: none"> • Dispersion becomes difficult during buildup when maintaining an acceptable vulnerability level to probable enemy nuclear, chemical, and biological strikes. |
| Traffic. | <ul style="list-style-type: none"> • Strict enforcement of traffic circulation plans and traffic control may become extremely critical because of restrictive limits of the assigned division crossing front and the limited number of crossing sites. • Special equipment and specially trained personnel are required to assist the passage of units at congested crossing sites. |
| Communications. | <ul style="list-style-type: none"> • Communications may become saturated, requiring additional signal units and equipment to provide sufficient communications for movement control and for combat units on both sides of the river. • Radio listening silence may be required, generally placing a great dependence on wire communications just before the assault. |

Command and control.

- A high degree of command and control may be required to permit adjusting plans to changes in the situation.

Security.

- To prevent compromise of the actual crossing area and the attack, communications security devices and techniques must be used in all phases of planning and execution.
- The degree of reliance on radio and electronic surveillance means, particularly during the crossing phase, increases the probability of disruption of these systems by electronic countermeasures unless adequate provisions are made for effective signal security practices and electronic counter-countermeasures.

Section III. TYPES OF RIVER-CROSSING OPERATIONS

1-6. Hasty River Crossing

A hasty river crossing is a planned operation conducted as a continuation of the attack.

The hasty crossing is feasible when

- enemy defenses are weak.
- friendly nuclear or chemical weapons can disrupt enemy defenses.
- appropriately equipped forces are available to advance rapidly to and across the river.

A hasty crossing is characterized by

- speed.
- surprise.
- minimum loss of momentum at the river.
- minimum concentration of forces in the way of personnel and equipment.
- detailed planning to insure that adequate crossing means are readily available when needed by assault forces.
- less vulnerability to nuclear or chemical-biological attack.

Clearance of enemy forces from the near bank is not a prerequisite.

1-7. Deliberate River Crossing

A deliberate crossing is required when a hasty crossing is unfeasible (enemy defenses are very strong or the river obstacle is severe) or when offensive operations must be resumed at the river line.

A deliberate crossing is characterized by

- detailed planning.
- deliberate buildup and preparation.
- delay at the river line.
- deception.
- clearance of enemy forces from the near bank.
- centralized planning and control.

CHAPTER 2

INTELLIGENCE

2-1. General

To develop sound river-crossing plans, the commander needs timely and detailed intelligence. All available organic intelligence assets and non-organic specialized intelligence agencies should be exploited with particular emphasis of essential elements of information (EEI) on the characteristics of the river and adjacent terrain in addition to acquiring detailed intelligence on the enemy.

Small enemy forces that would not pose a significant threat in a normal offensive operation may be capable of delaying or disrupting river-crossing operations. Assault forces are especially vulnerable while crossing and when landing on the far bank.

The assault force commander should have detailed knowledge of any enemy force that can employ direct fire weapons on crossing sites to be used. The location and the composition of enemy reserves are important because assault forces are initially vulnerable to counterattack, particularly by armor.

Planners need detailed information on the river to develop sound plans for allocation of crossing means, selection of crossing sites, and construction and operation of surface crossing means.

2-2. Specific

In preparation for a river-crossing operation, intelligence should be produced on the following:

Enemy capabilities
based on

- disposition.
- composition.
- strength.
- tactics.
- nuclear weapons.
- chemical agents.
- biological agents.
- availability and effectiveness of air support.
- enemy intelligence, surveillance, and target acquisition.
- ability to reinforce.
- weather.

River characteristics,
to include

- width and depth.
- character and velocity of the current.
- crosscurrents.

- undertow.
- tidal flow.
- condition of the banks including soil composition.
- height of bank.
- slope of bank.
- condition of the riverbed.
- flood and ice conditions.
- general fordability by troops and vehicles.
- location and characteristics of crossing sites, including fords.
- susceptibility of its flow to being temporarily halted or diverted by atomic demolition munitions or other techniques.
- the effects of sudden, violent, and torrential storms.

Natural and manmade obstacles:

their location, characteristics, and possible effects on movement of both foot troops and equipment.

Terrain considerations:*

- areas for assembly and dispersal.
- cover and concealment near the crossing sites.
- fields of fire.
- ground avenues of approach to the river and to objectives on the far bank.
- low-altitude routes of approach to crossing sites and assembly areas.
- helicopter and airplane landing areas.
- positions for supporting weapons, observation posts, radar sites, and combat service support installations.
- road nets and approaches, to include width, surface, and capacity of roads.
- rail nets to and from crossing sites.
- road and rail routes beyond the projected bridgehead.
- effects of precipitation on soil trafficability and river conditions.
- visibility.
- effects of wind and precipitation on use of smoke and incendiaries.
- factors that may affect employment of nuclear fires, chemical agents, radioactive fallout, and air operations.

Weather, to include

Local resources in the area, to include information on

- structural steel.
- sand and gravel.
- boats, barges, and ferries.

*FM 80-10 contains details on terrain intelligence; FM 5-36 contains details on route reconnaissance.

- aerial tramways.
- timber and lumber.
- local labor.

Intelligence concerning civilian guerrilla and paramilitary forces on either side of the river that affect the crossing operation, including information necessary to support psychological and counterintelligence operations.

2-3. Military Intelligence Support

Tactical units involved in river-crossing operations require extensive and detailed intelligence. Full use must be made of the capabilities inherent in supporting military intelligence elements to provide much of the intelligence needed. Available to the commander is information received from interrogation of prisoners of war; information through counterintelligence channels obtained from refugees and line crossers; and information obtained by specialized collection units. Additionally, based on air reconnaissance, imagery interpreter teams can furnish detailed and up-to-date intelligence concerning the entire area of the crossing site to include terrain characteristics, obstacles, weaponry, troop emplacement, etc. Intelligence collected through electronic surveillance means is of prime importance to the tactical commander. In some cases, it may be the only source available because of the lack of prisoners for interrogation, the loss of air superiority, or bad weather, or a combination of the three.

2-4. Reconnaissance

Detailed intelligence on the enemy situation and the nature of the river is essential to the assault force commander. Since even small enemy forces can seriously interfere with a crossing, the commander must have detailed knowledge of the location of any enemy force that can place observed fire on the river. The location of enemy reserves also is important because the crossing force is initially vulnerable to counterattack. Friendly reconnaissance is, therefore, directed toward locating these enemy units to reduce their effectiveness by nuclear or nonnuclear fires at the time of attack. Employing aircraft for radar, electronic, visual, and photographic reconnaissance is a fast and effective means of obtaining information on the enemy and the area of operations. Knowledge of the presence, location, nature, capabilities, and courses of action of opposing forces can also be gained rapidly through exploitation of electric emissions. The use of artillery or air-delivered sensors provides continuous surveillance on approaches to the crossing site.

The physical reconnaissance and the selection of crossing sites begin as soon as the security situation permits, to refine or confirm information gathered from other sources. Artillery and organic fires may be employed to restrict the effectiveness of the enemy on the far bank from firing on friendly reconnaissance elements in the crossing area.

When sufficient personnel are available and when the situation permits, entrance, underwater, and exit reconnaissance are conducted simultaneously. Reconnaissance teams report applicable items shown in paragraphs 3-8, 3-37, and 3-39. An estimate of work required to improve the water-obstacle banks is also reported. When reconnaissance personnel cannot

remove or destroy obstacles or minefields, or when the banks require improvement, supporting engineer personnel may be provided to assist them. If supporting personnel are not immediately available, the order of crossing may have to be changed or a different crossing site may have to be selected.

Doctrinal Recapitulation

The assault force commander should have detailed knowledge of any enemy force that can employ direct fire weapons on crossing sites to be used.

The location and the composition of enemy reserves are important because assault forces are initially vulnerable to counterattack, particularly by armor.

Preparation for a river-crossing operation should include producing intelligence on enemy capabilities, river characteristics, natural and man-made obstacles, terrain considerations, weather, local resources in the area, and the local civilian population.

The physical reconnaissance and the selection of crossing sites begin as soon as the security situation permits.

CHAPTER 3

CONCEPT AND PLANNING GUIDANCE

(NATO STANAG 2019 and 2088, ABCA SOLOG 28 and 108, CENTO STANAG 2019 and 2088, and SEATO SEASTAG 2019)

This chapter sets forth basic guidance for commanders and staff officers for planning and executing a river-crossing operation. Section I discusses considerations of the defenses applicable to all levels of command. Section II outlines the concept of river-crossing operations; paragraphs 3-4 to 3-13 and 3-20 to 3-23 are of interest to all levels; paragraphs 3-14 to 3-19 are applicable at division level and above. Section III covers the planning of a river-crossing operation at all levels of command. Crossing means available are covered in section IV—applicable at all levels. Section V discusses crossing sites and their selection at division level and above—of interest to all personnel. Section VI provides information on the capabilities and employment of supporting units. Section VII discusses factors affecting time of crossing and construction of bridges and rafts primarily applicable at division level and above.

Section I. CONSIDERATIONS OF DEFENSE

3-1. Methods of Defense

In defending a river, the defender may—

- | | |
|--|---|
| Use the river as a major obstacle. | The defender conducts an area defense organized in depth along and in rear of the river. In this method, security forces frequently deploy forward of the river line to delay and disorganize the attacker as he approaches. |
| Defend the river with light security forces. | The defender holds the bulk of his forces in the rear. When the attack develops, the defender counterattacks with maximum strength. |
| Defend in strength forward of the river line. | This occurs when the terrain forward of the river line is more defensible than the river itself. |
| Use insurgents, employing guerrilla warfare methods. | Insurgents may not defend a river line by deliberate methods, but may employ light forces on the friendly near bank. The insurgents may then wait until the attacking forces are astride the river or the bulk of these forces are deployed |

across the river and then attack the followup or rear echelons, causing such harassment as to delay and/or jeopardize the river crossing.

3-2. Problems of the Defender

Since the defender lacks the initiative, his plans to meet the river crossings at every conceivable point may be complicated by—

- an inability to organize his positions in depth.
- extended frontages with insufficient communication and control facilities.
- inadequate information as to the attacker's capabilities.
- the attacker's use of surprise.
- possible neutralization of prepared positions permitting a relatively unopposed crossing by the attacker.
- being subjected to an airborne/airmobile attack.

3-3. Conduct of the Defense

When the attack develops, the defender determines where the principal threat exists. An early and accurate determination is the most difficult problem of the defense. The principal threat may vary as the operation progresses.

The defender seeks

- to inflict maximum damage on enemy forces and crossing equipment before and during the attack.
- to destroy the attacking forces while they are astride the river.
- to eject the attacker before he firmly establishes himself on the near bank.
- to deny enemy forces access to the crossing site.

The defender positions
fire support elements

- in depth and displaces his supporting weapons to mass fires on defile approaches, critical crossing points, and the attacker's rear areas.
- on the attacker's side of the river to support the defender's security forces.
- to take advantage of information from STANO and to emplace STANO items, as well as to emplace scatterable mines.

The defender makes
provisions

- to shift his supporting fires to support his counterattacking force.
- to emphasize the maintenance of probable routes for displacement of all counterattack elements, traffic control, and positions for possible counterattack areas.
- to use all means of supporting fires (both

nuclear and nonnuclear, including chemical, surface, and aerial weapons) where they can disrupt the attacker's assault, destroy his crossing means, and support counterattacks.

- to utilize STANO items and techniques to the maximum.
- to employ scatterable mines.

The defender disposes

- armored and mechanized forces in reserve at locations that permit their timely intervention in defended areas or probable crossing sites.
- reserves to facilitate counterattack before the attacker has developed superior combat power on the defender's side of the river.

The defender may use airmobile forces as a mobile counterattack force

- to capitalize on flexibility, rapidity of movement, and tactical surprise.

When confronted with a possible airborne/airmobile or tactical air attack, the defender may—

- defend key locations.
- integrate air defense artillery into the defense plan.
- maintain mobile reserves.
- employ extensive target acquisition means.
- employ scatterable mines.
- cover, by preplanned artillery fires/minefields, areas suitable for use as landing zones.

The defender must prepare to counter the extensive use of amphibious vehicles by the attacker.

Defense against amphibious vehicles may include

- surface and/or submerged mines anchored in the waterway.
- minefields and other obstacles at likely points of entrance and exit along the river.
- antiarmor weapons well forward.
- nuclear and nonnuclear fires delivered by air and ground delivery means.
- direct/indirect artillery fires.

During river-crossing operations, the vulnerability of attacking forces is relatively unique, and success or failure is significant. Therefore, the defender may be expected to concentrate his intelligence, surveillance, target acquisition, and information integrating means on development of indicators or tipoffs to plans and preparations for river crossings.

Section II. CONCEPT OF RIVER-CROSSING OPERATIONS

3-4. Broad Aspects of Operations

A river-crossing operation includes—

- Advance from the line of departure to the river.
- Assault of the river.
- Advance on the enemy side of the river.
- Securing of the bridgehead.

3-5. Attack on a Broad or Narrow Front

An attack on the broad front is preferred over an attack on a narrow front because it permits a more rapid crossing of the entire force and reduces the overall vulnerability of the attacking force.

An attack on a broad front may cause the defender to delay committing his reserves until he evaluates the situation in all areas and determines which crossings most seriously threaten his defense. If the enemy delays too long in committing his reserves, the attacking force can develop enough combat power on the far bank to repel his counterattack.

An attack on a broad front has the major disadvantages of requiring more support (particularly engineer) and increasing the difficulty of command and control.

An attack is made on a narrow front only when the enemy situation or conditions of terrain dictate. When access routes to or egress routes from the river are severely limited, an attack on a narrow front may be required. An attack on a narrow front may also be required because of the limited availability of engineer assets.

3-6. Advance to the River

The advance to the river in a hasty crossing is so timed that the crossing unit does not pause on the friendly side to form a concentration of troops and equipment, but moves directly into the water. Once started, the assault forces move rapidly to keep the enemy off balance and to complete the crossing before the enemy can establish strong defenses. A rapid advance to the river may permit securing of bridges before the enemy can destroy them. However, securing of bridges intact should not be part of the crossing plan to move the force across the river, but rather a bonus.

3-7. Line of Departure

A line of departure (LD) normally is used to coordinate the assault of the river obstacle. In a deliberate crossing, because the enemy will have been cleared from the near bank, the LD is the near edge of the river; however, the assault elements may be located well back from the near bank in positions providing protection from enemy observation and direct fire weapons. In a hasty crossing, because it is a continuation of the attack and clearance of the enemy forces from the near bank is not a prerequisite, the LD may be some distance from the river. The LD for a hasty crossing should be designated on easily identified terrain from which rapid uninterrupted movement to the river can be accomplished.

3-8. Assault Crossing Sites

The assault forces use amphibious vehicles, fording vehicles, assault boats, or a combination of these crossing means to make the initial river crossing. The physical characteristics of the crossing sites for each of these means are contained in paragraph 3-38.

The following considerations influence the selection of assault crossing sites:

- | | |
|--|---|
| <p>Adequate maneuver space.</p> | <ul style="list-style-type: none"> • Maneuver space must be available on the near bank to accommodate the movement of the assault force to the river line and on the far bank to permit maneuver of units in accordance with the tactical plan. • Obstacles, tight boundaries, and defiles should be avoided. • A minimum of one assault crossing site is normally selected for each assault battalion. • Depending on the requirement for dispersion, an assault crossing site for an assault battalion may consist of only a few entry points, or it may be a portion of the river line 500 to 2,000 meters long. |
| <p>Suitable, concealed assembly areas.</p> | <ul style="list-style-type: none"> • If infantry is to make the crossing in assault boats, attack positions will be used. • Mechanized forces employ assembly areas well to the rear and do not normally use attack positions. |

3-9. Formation for Crossing

The assault force commander determines the formation in which units cross. His decision is influenced by the scheme of maneuver, width of the river, terrain characteristics, enemy capabilities, number of entrances and exits, and equipment and troops available. Formations are as follows:

- | | |
|-----------------|--|
| <p>Line.</p> | <p>Assault forces should cross the river in a line formation when conditions permit.</p> |
| <p>Column.</p> | <p>All elements with nonamphibious vehicles usually cross in a column formation, confined to available fording sites.</p> |
| <p>Echelon.</p> | <p>All elements with amphibious vehicles usually cross in an echelon formation, within waves, unless they are restricted by the number of crossing sites. In that case, they cross in column formation. The echelon formation should be used to insure that upstream amphibious vehicles do not drift into downstream vehicles that are fording the river.</p> |

3-10. Assault of the River

In all river-crossing operations, the assault forces move as rapidly as possible across the river obstacle.

Once the assault of the river is started, the attack is pressed and its momentum is sustained. Every effort is made to maintain a continuous flow of personnel, equipment, and supplies across the river obstacle without delays or congestion on either side of the river.

When the enemy has a nuclear, chemical, or biological capability, subsequent crossings usually are made to the flanks of the initial crossing sites to maintain adequate dispersion on the far bank. When the initial assault crossings are reinforced by reserve units, dispersion may be maintained by expanding the bridgehead to the flanks.

When friendly guerrilla forces are available to support the crossing, such support may include

- interdicting approaches to crossing sites.
- attacking enemy reserves.
- destroying enemy command posts and communication facilities.
- directing friendly fires.*
- conducting diversionary attacks.

3-11. Surprise

Surprise is desirable in a river-crossing operation, and the commander should use all means at his disposal to achieve it.

He may use some of these means:

- Feints and demonstrations.
- Dummy crossing sites.
- Stealth.
- Camouflage.
- Supporting fires to draw the enemy away from crossing sites.
- Signal security.
- Electronic warfare (EW).

3-12. Advance on the Far Bank

Once the assault forces land on the far bank, they advance as rapidly as possible toward their objectives.

Units do not attempt extensive reorganization on reaching the far bank; but, as the attack progresses, reorganization is continuous until the units are organized and deployed in the formation necessary to continue the attack.

Commanders avoid dissipation of forces to achieve minor tactical success.

Leading elements of the assault forces normally clear crossing sites and provide local security until relieved. The relieving units may be elements of the assault force or other elements designated by the assault or crossing force commander. Enemy forces that interfere, or can interfere, with the accomplishment of the mission are contained or destroyed. The assault force bypasses or contains, with minimum means, enemy elements of insufficient strength to jeopardize the mission. Bypassed enemy forces are reported to higher headquarters or to the follow and support unit if one has been assigned this mission.

*FM 31-21 provides details on the use of guerrilla forces.

Reserves remain on the near bank until sufficient space has been gained to permit avoiding unnecessary concentration on the far bank. Reserves are prepared to move to the far bank quickly to exploit success or counter enemy attacks that threaten the success of the operation.

3-13. Buildup on the Far Bank

Throughout a river-crossing operation, the crossing force must be able to defeat or block anticipated enemy reaction, including counterattacks, on the far bank.

Plans must provide for a rate of crossing and buildup on the far bank that exceeds the rate at which the enemy can concentrate against the force.

To insure complete and uninterrupted artillery coverage within the bridgehead, plans must provide for the crossing of field and air defense artillery weapons early in the operation.

3-14. Selection of a Bridgehead

The control headquarters of the crossing force has overall control of the operation and normally designates the limits of the bridgehead. There may be instances when the control headquarters will request that the crossing force select the location of the bridgehead line. Under these circumstances, the control headquarters would give final approval on the location.

Provision of flank security for the bridgehead is facilitated by tying the ends of the bridgehead line to the river obstacle. The flanks of the bridgehead line should include good defensible terrain, if available.

Although a bridgehead line is normally designated to indicate the limits of the objective area in the development of the bridgehead, it is not required.

When a bridgehead line is determined to be unessential, principal terrain features that mark the outer limits of the bridgehead are generally designated as objectives and delineate the limits of the bridgehead. Once these objectives have been secured, the bridgehead is considered to be secured.

A combination of a bridgehead line and objectives may be used when the situation warrants their use.

Whether or not a bridgehead line, objectives, or a combination of a bridgehead line and objectives is used to show the bridgehead objective area, the mission assigned to the division and the manner in which the control headquarters intends to use the bridgehead objective area will determine its actual size. Generally, the bridgehead must be large enough to include the combat, combat support, and combat service support elements that the control headquarters envisions will be required on the far bank.

If the division is assigned a mission to cross the river and be prepared to continue the attack, without other corps units within the bridgehead, the bridgehead need only provide space for the combat, combat support, and essential combat service support units organic to or supporting the division.

If the division is assigned a mission to cross the river and be prepared to

assist the passage of another unit, sufficient space must be secured on the far shore to accommodate the combat, combat support, and essential combat service support units of the assaulting division and those of the unit that will pass through.

Occasionally the control headquarters will give the crossing force a mission of crossing a river and be prepared to continue the attack, and it will want to put some of its combat and combat support units into the bridgehead to be prepared to assist the assaulting units. This mission most often occurs when a corps wants to move its reserve across the river into the area of one of the assaulting divisions—an ideal position to counterattack should one be necessary.

When the bridgehead has been secured, the river-crossing operation is ended.

3-15. Selection of Objective Areas (Phasing)

Throughout a river-crossing operation, the crossing force must be able to defeat or block anticipated enemy reaction, including counterattacks, on the far bank. Plans must provide for a rate of crossing and buildup of combat power or combat, combat support, and required combat service support forces on the far bank that exceeds the rate at which the enemy can concentrate against the crossing force.

The selection of objective areas is used as an aid in planning and controlling a river-crossing operation. It is used with other standard tactical control measures such as phase lines, objectives, and line of departure.

To facilitate selection of objective areas, the planner should start at the bridgehead line and determine forces and assets required to secure the line. From the bridgehead, the planner must determine whether his force can secure the bridgehead line in a single assault from the LD forward. If this cannot be visualized because of a requirement for a change in the scheme of maneuver or a major reorganization of forces, then the planner should select one or more intermediate areas where these changes or reorganization can be accomplished.

For each intermediate area selected, the planner must again visualize the requirement for forces and assets required to secure that intermediate area. If this area can be secured in a single assault from the LD, additional intermediate areas are unnecessary. When this plan cannot be accomplished, additional intermediate areas are selected until a complete plan is developed from the bridgehead line back to the LD. The number of objectives or intermediate objective areas required for an operation that includes a river crossing varies.

Specifically, the number of intermediate objective areas selected for a river crossing is based on an evaluation of—

- The severity of the river obstacle.
- The capability of the assault force to project combat power forward.
- The distance and terrain between the river line and the bridgehead line.

- Fire and logistic support available.
- The enemy force's ability to interfere with the crossing and the advance on the far bank.

As a result of selecting intermediate objective areas for the above reasons, the river-crossing plan may be a phased operation.

Airmobile or airborne assaults may be conducted in any or all phases of a river crossing, in conjunction with a ground assault, if the situation warrants their use.

3-16. One Objective Area (One-Phase Operation)

Under extremely favorable circumstances, troops can possibly cross a river and secure the entire objective area, the bridgehead, in a single, sustained attack. This type of crossing, one-phase, may be feasible when the enemy cannot significantly delay the advance of forces making the initial assault crossings or disrupt subsequent operations (fig 3-1).

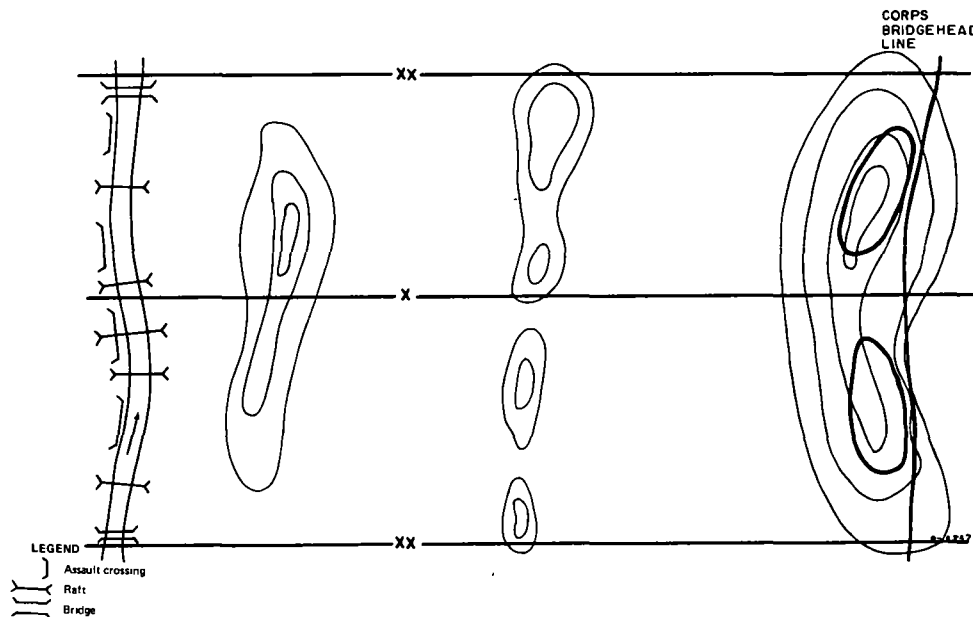


Figure 3-1. Schematic of a one-phase crossing.

3-17. Two Objective Areas (Two-Phase Operation)

After considering all the factors involved, it may be necessary to plan a temporary halt—

to insure that sufficient time is available for a limited buildup.

to permit a coordinated attack by the assault forces to secure the bridgehead.

In this instance, the planner must select an intermediate objective area in addition to the bridgehead objective area. Notice that he employs "inverse planning" from the bridgehead line back to the river obstacle. Whether

corps or division selects the area, the criteria for its selection are the same. The area should—

provide space on the far bank to permit the division commander to build up and reorganize his forces for continuing the attack.

provide sufficient space for all the division's combat, combat support, and essential combat service support elements.

provide for good defensible terrain, well forward.

The first phase of a two-phase operation includes the assault crossing of the river and the securing of the intermediate objective area. The second phase includes any necessary tactical and logistic buildup, followed by an attack to secure the assigned portion of the bridgehead. The river crossing is concluded when the bridgehead is secure (fig 3-2).

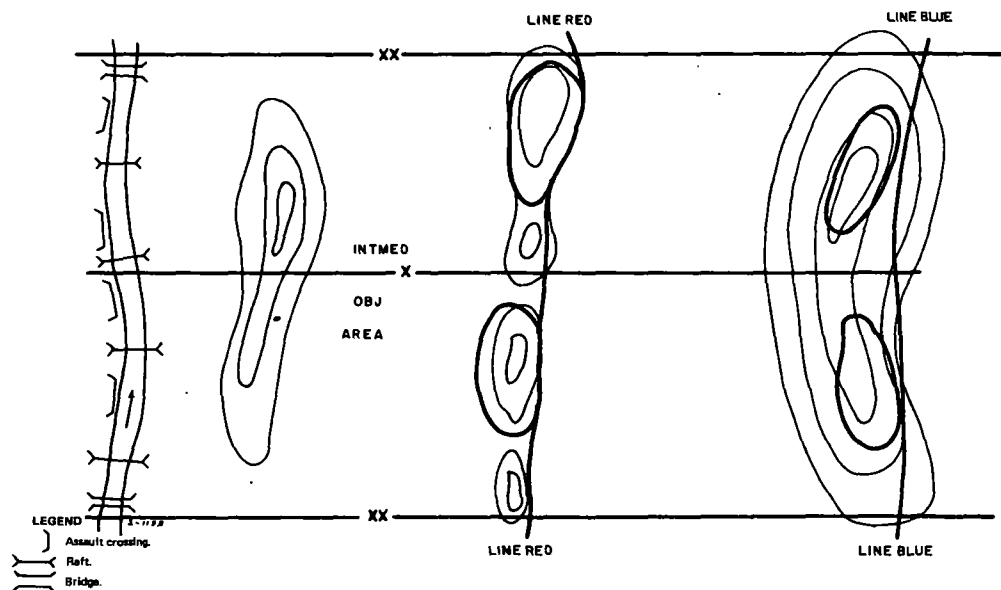


Figure 3-2. Schematic of a two-phase crossing.

3-18. Three Objective Areas (Three-Phase Operation)

If either corps or division decides that it is necessary for the assault brigades to halt on the far bank for reorganization or buildup (before securing enough space for the division to cross and reorganize), two intermediate objective areas are selected. The criteria for selecting the first intermediate objective are that it—

- Provides sufficient space within the division zone to permit the assault brigade commanders to reorganize and build up their brigades before continuing the attack to secure the division intermediate area.

- Provides good defensible terrain well forward to facilitate any necessary defense of the area.

The criteria for selecting the second intermediate objective area are the same as described in the preceding paragraph. The first phase of a three-phase river crossing includes the assault crossing of the river and the securing of the "first intermediate objective" area. The second phase includes the required buildup and necessary reorganization, followed by the attack to secure the second intermediate objective area. The third and final phase includes the buildup and attack to secure the assigned portions of the bridgehead (fig 3-3).

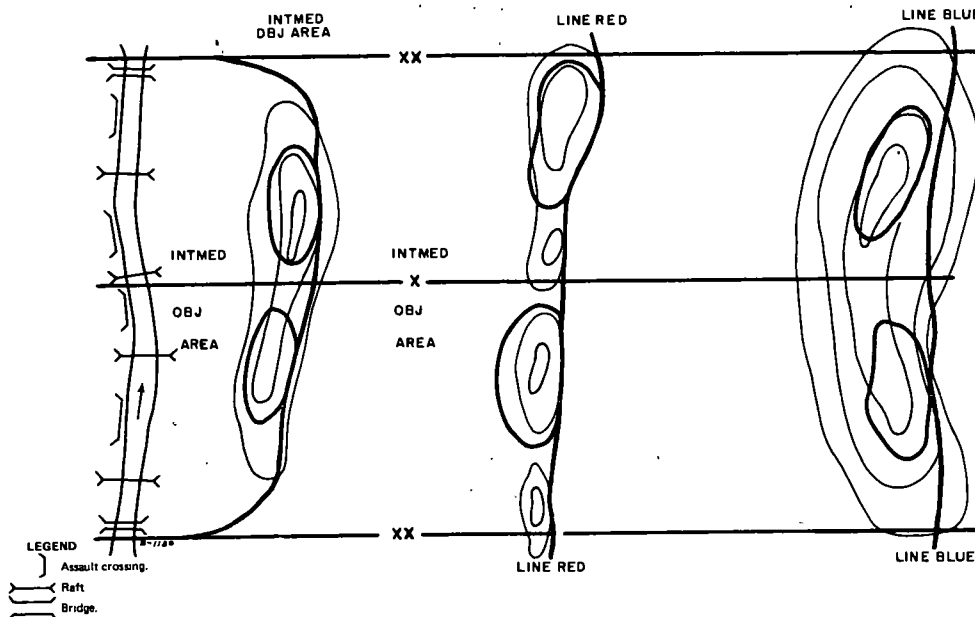


Figure 3-3. Schematic of a three-phase crossing.

3-19. Execution of Planned Phases

Although the plans for a river crossing may provide for a delay between attacks in successive phases, this time interval may not be evident during execution of the plan. If, during the crossing, elements of the force can be moved to the far bank at a rate faster than originally planned, or if enemy resistance is less than expected, temporary defense to accomplish reorganization or buildup may not be necessary.

Plans can and should be modified to exploit opportunities that develop as the operation proceeds.

Gaining sufficient advantage and momentum should be emphasized to permit the commitment of an exploitation force at the earliest possible time.

3-20. Armored Cavalry and Air Cavalry Forces

Armored and air cavalry forces can perform a variety of missions that contribute to the speed and success of a river-crossing operation.

Appropriate missions include

- reconnoitering of crossing sites.
- securing bridges or fording sites intact ahead of advancing ground forces.
- securing terrain objectives that dominate the crossing sites.
- preventing the movement of enemy reserves.
- assisting in securing the bridgehead.
- reinforcing units on the far bank.
- reducing enemy defenses along the river line.
- conducting feints and demonstrations.
- disrupting enemy communications.
- counterattacking enemy penetrations.

Details on air cavalry operations are covered in FM 17-36 and FM 17-37.

3-21. Airmobile and Airborne Operations

Although airlifted forces may permit the rapid securing of selected objectives, such action must contribute to the successful accomplishment of the river crossing.

The employment of airmobile and airborne forces in support of a river crossing may include—

- Reconnaissance and security missions.
- Raids.
- Antiairborne, antiairmobile, and counter guerrilla operations.
- Exploitation of the effects of nuclear and chemical weapons and conventional bomber strikes.
- Seizure and retention of key terrain.
- Feints and demonstrations.
- Economy of force missions.
- Countering of enemy actions to prevent the river crossing.
- Shore-to-shore operations.
- Envelopment and over-obstacle assault operations.
- Composition of a highly mobile reserve.

Early in the approach to a river, air cavalry reconnaissance forces determine enemy strength and disposition and locate crossing sites. A river is not an obstacle to airmobile forces; therefore, the enemy may have to reduce the strength of his river line to protect his rear area.

Army pathfinders can assist in the control of airmobile operations and if employed early can assist in controlling surface traffic (both waterborne and ground vehicles).

Airmobile forces seize objectives that dominate the ground forces' crossing sites. They should be on their objective early enough to warn of counterattacking enemy forces and to prevent interference with the crossing of friendly forces. Details concerning airmobile operations are covered in FM 57-35. Details of airborne operations are covered in FM 57-1 and FM 61-100.

3-22. Armor Forces

The inherent swim capability of the armored reconnaissance airborne assault vehicle (ARAAV) and other light armored vehicles, plus the fording capability of tanks, should be exploited to the utmost. Principal restrictions on their employment are their vulnerability to enemy fire while in the water and the limitations imposed by the stream characteristics. Details concerning armor operations are covered in FM 17-1.

3-23. Follow and Support Units

In a hasty river crossing, a follow and support unit is usually designated. Follow and support units may be assigned the tasks of mopping up, destroying bypassed or contained enemy forces, and blocking the movement of enemy reinforcements into the area. A division may provide a follow and support unit from its own resources, or corps may provide one. In any case, an element assigned a follow and support mission is a committed force and is no longer a reserve unit. Orders must specifically designate follow and support units and outline their responsibilities.

Section III. PLANNING OF RIVER-CROSSING OPERATIONS**3-24. General**

Planning for a river-crossing operation is accomplished at all echelons of command.

Warning orders are used to alert subordinate echelons.

Logistic requirements are determined.

Plans are completed well in advance.

Long-range planning at corps and higher echelons.

Short-range and current planning at corps, division, brigade, and lower echelons.

To permit timely preparation of plans, intelligence and other pertinent information are disseminated with the warning orders, or soon thereafter.

These requirements are then placed on higher headquarters.

Requirements for support of other services or special troop units are coordinated with appropriate headquarters.

This will permit—

- crossing means and other support provided by higher headquarters to be available when and where required.
- preparation of the supporting plans in the detail required.
- rehearsal of the operation, if feasible.

3-25. Sequence of Operation Planning

Planning for a river-crossing operation is basically the same as that for any other operation; however, the river obstacle requires emphasis on certain aspects. Planning is developed from the bridgehead line back toward the river line. These aspects and the sequence are generally applicable from corps through company level. Appendix D contains a sample

operation order and a crossing plan. The planning sequence is in appendix C.

Elements of the planning sequence are—

Selection of a bridgehead, intermediate objective areas, and terrain objectives, as necessary.

Determination of requirements for and allocation of—

- assault forces.
- crossing means and crossing sites.
- Army aviation, engineer, military police, chemical, US Army Security Agency, and similar units.
- fire support.
- air defense support.
- special communications support.
- combat service support.

Development of crossing plan, including operational times for rafts and bridges.

Development of air and surface movement plans.

Development of a training program.

Development, coordination, and integration of combat deception plans.

Development and integration of all aspects of intelligence, security, and electronic warfare are included in planning from inception, and appropriate units are tasked with support requirements.

3-26. Hasty River Crossing

Planning

The plan for a hasty crossing emphasizes speed and aggressiveness and allows subordinate commanders sufficient freedom to exploit success. Detailed planning of the hasty river crossing should include provisions for crossing means, fire support, and other necessary support. Plans should provide for rapid movement over the river obstacle, rapid employment on the far bank, early commitment of suitable air defense artillery units for crossing site defense, and early commitment of an exploiting force.

In a hasty river crossing, all assault forces may not reach the river simultaneously; therefore, plans should provide for decentralizing control of crossing means and allowing subordinate commanders to determine specific crossing times for their assault elements.

Although a hasty crossing is not predicated on securing bridges intact, alternate plans should be prepared to cover the effective use of existing bridges. The use of nuclear weapons, chemical agents, scatterable mines, airmobile forces, airborne forces, special forces, or guerrillas may be included in the scheme of maneuver or fire support plan to assist in the capture of bridges intact.

Use of aircraft is of particular importance in planning a hasty crossing (para 3-30).

Execution

Following the rupture of the enemy's defenses on the near bank, the approach to the river is made on as broad a front as possible and at maximum speed.

The assault forces move across the river, using organic and expedient crossing means to the maximum.

When tactically feasible, raft assembly and bridge construction or repair begin without delay. Consideration involved in raft assembly and bridge construction is discussed in paragraph 3-47.

The bulk of the assault units passes immediately through the crossing sites, leaving minimum forces to secure them. The security elements of the assault force defending the crossing sites should be relieved early by successive elements.

The initial assault in the hasty crossing should result in the rapid seizure or sufficient area to insure that the crossing sites are relatively secure from enemy ground action and direct fire.

3-27. Deliberate Crossing

A deliberate crossing requires development of detailed plans to optimize the employment of all the means available to the crossing force. Plans for a deliberate crossing generally provide for more centralized control of crossing means, fire support, and crossing times of assault and support elements than for a hasty crossing.

Section IV. CROSSING MEANS

3-28. General

All available crossing means are used to achieve maximum speed in the crossing and to reduce criticality of any one crossing means.

Crossing equipment includes	• assault boats. • fording vehicles. • amphibious swimming vehicles. • rafts. • footbridges. • floating bridges. • aircraft. • special craft. • armored launched bridges. • portable, fixed bridges.
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The use of these items for a specific operation depends on availability, the characteristics of the river, terrain on both sides of the river, the availability of construction or operating personnel, and security consideration.

Fixed bridging may be used to meet special requirements, but rarely is

used extensively in the early phases of an assault crossing. Plans should include the use of any local means and standard equipment. Appendix B contains additional information on crossing equipment.

3-29. Amphibious Swimming Vehicles

Tracked landing vehicles and armored carriers are preferred for transporting the assault waves, while unarmored amphibious swimming vehicles are preferred for crossing supplies and equipment.

These factors may limit the use of amphibious swimming vehicles:

- Entry and exit points must have gentle gradients and firm bottoms.
- Stream velocity is critical in determining the feasibility of using amphibious swimming vehicles.
- Noise and the need for surprise may limit the use of amphibious swimming vehicles in the assault.

Appendix B contains details, types, and capabilities.

3-30. Aviation

Aircraft provide a crossing means not directly affected by the severity of the river obstacles and, therefore, can contribute to the speed and success of the river crossing when used with other crossing means.

Aircraft may be used to cross troops, artillery, equipment, and supplies by airlanding or air delivery.

Army aircraft will normally be available to provide support in accomplishing—

Battlefield surveillance and reconnaissance (to include airborne radio direction finding).

Medical evacuation.

Aerial fire support.

Aerial command and control.

The external loading capability of helicopters adds flexibility in handling equipment and supplies. Preassembled parts of float bridge equipment may be airlifted into raft and bridge sites to expedite operation of these crossing means (fig 3-4).

Helicopters can also be used to establish an "aerial bridge" with loading/unloading points in the immediate vicinity of surface crossing sites. A single, medium-cargo helicopter operating at minimum altitude between landing sites can provide shuttle service across the river. An aerial bridge can be placed in operation when the tactical situation permits, normally when the advance on the far bank has eliminated enemy small-arms fire and ground observation from the landing sites. Use of aerial bridges during the early hours of a crossing facilitates emergency movement of personnel and cargo without disruptive changes in the crossing plan.

3-31. Assault Boats

Assault boats are used for the assault when sufficient amphibious vehicles



Figure 3-4. Helicopter, lifting bridge floats.

are not available or when the nature of the water obstacle and its approaches and exits prevents their use. The use of assault boats reduces the speed of the crossing operation and increases the period of exposure to enemy counteraction. Assault boats may also be used for silent crossings, feints, and patrols. Appendix B contains further information on assault boats.

When conditions require the use of assault boats to cross the assault waves

- boat teams consisting of the engineer boat crews and infantry troops of the assault forces are formed.
- engineer crews and infantry troops are assigned to boat teams well in advance for each wave of the crossing.
- engineer crews remain with the assault boats when they are spotted for the crossing and remain with their boats until the crossing is completed.
- a guide from the engineer crew meets the infantry boat team for the initial wave at the attack position and leads the initial infantry boat team over a previously reconnoitered and marked route to the boat.
- the infantry boat team assists the engineer

boat crew by carrying the assault boat to the crossing site.

- the distance from where the engineers spot the assault boats to the near bank should be as short as possible consistent with cover and concealment, security, and surprise.
- engineer assault boats and crews operate at the same assault crossing site throughout the operation.

3-32. Fording

Vehicles with shallow or deep-water fording capabilities are extremely valuable in assisting the assaulting forces. Fording site characteristics are discussed in paragraph 3-39.

3-33. Rafts

Because of their size and mobility, rafts are less vulnerable than bridges to enemy fires. Rafts may be used to transport high-priority cargo across the river in the initial stage of the operation. The use of rafts provides a greater choice of crossing sites than bridges but may delay the opening of bridges and drastically reduce the crossing rate.

On large unfordable rivers, rafts normally are the only initial means of crossing tanks and heavy vehicles. In later phases of the operation, rafts continue to cross returning vehicles and to supplement the bridges.

When possible, raft sites should be located downstream from bridges if both are to operate concurrently. A raft without its power may otherwise drift into the bridge, damaging or destroying both the bridge and the raft.

Appendix B contains details on the transportation, construction, operation, and capabilities of standard rafts.

Operations subject to enemy observation and countermeasures may demand the initial use of dispersed rafts. However, rafts alone cannot move traffic at rates normally required to support a rapid advance beyond the river. Rafts must be replaced or supplemented by bridging when the enemy observation or reaction has been reduced. Appendix D contains further comparison of alternate crossing capabilities.

3-34. Floating Bridges

Bridges are placed in operation as soon after H-hour as enemy observation and direct fires are neutralized. Time required for the assembly of bridging equipment and site preparation, to include construction of approaches, is important in determining when a bridge can be placed in operation. Appendix B contains data on the transportation, construction operation, capacities, and limitations on bridges.

Ideally, each assault division will have in its crossing front at least two floating bridges capable of carrying divisions loads. After the bridgehead has been established, additional heavy vehicular bridges, either floating or fixed, are erected as necessary (normally by corps and army engineer units).

Normal wear and tear and changes in water level necessitate constant maintenance of all bridges and their approaches. Local reserves of equipment and the necessary working parties are kept available. Since bridges often are closed for temporary maintenance, the movement plan allows for traffic diversions. Floods and tides adversely affect the maintenance of floating bridges, particularly bridge approaches and abutments. Raft sites should be planned for use under such conditions. Paragraph 6-1 discusses effects of ice on float bridges.

When required, the engineers construct booms and nets upstream and downstream to protect the bridges. Protective devices are covered by fire and by all-weather surveillance. TM 5-210 shows schematically some measures to take to protect a bridge and discusses their employment.

3-35. Control of Crossing Means

Normally, the commander of the unit executing an assault crossing is provided control of the means needed to insure success of the operation. In a hasty river crossing, the actual crossing force may release control of appropriate crossing means to the assault force commanders. The overall control headquarters (corps or division) can justify retaining control only under exceptional conditions, e.g., in a deliberate crossing when elements of two adjacent units may be sharing crossing means located in the zone of one of the units.

Plans should provide for passing control of crossing means from the assault force to the crossing force as soon as the major portion of the assault force has crossed the river.

In a deliberate crossing, bridges to support the assault normally are constructed on order of the commander controlling the crossing means. A subordinate commander may be delegated this authority in a hasty crossing.

In a corps operation, heavy floating bridges normally are constructed on order of the corps commander; but authorization may be delegated to a division commander, particularly in a hasty crossing.

Timeliness of construction is essential. Loss of equipment resulting from premature construction may lead to failure of the crossing and possible loss of major elements of the crossing force. Failure to construct bridges early in the operation may result in delaying the advance beyond the river. This may allow the enemy time to reinforce with sufficient strength to delay or prevent securing the bridgehead (para 3-46).

Section V. CROSSING SITES

3-36. General

Selection of crossing sites is based primarily on—

- the physical characteristics of the available sites and adjacent areas.
- the capabilities of available crossing means.
- the availability of engineer effort.
- the existing or anticipated combat situation.

Conflicts between tactical and technical requirements are normal. The commander weighs all the factors involved to arrive at the best overall solution.

3-37. Physical Characteristics

The staff planner needs enough information on each potential crossing site to evaluate the influence of a site on any proposed plan for crossing the river.

Generally the planner needs to know—

- enemy capabilities and probable courses of action.
- the capability of moving troops, equipment, and supplies by each crossing means.
- the engineer effort required to improve and maintain the site to accommodate each crossing means.

More specifically, the planner needs to know the—

- bank, bottom, and water conditions of the river.
- concealment and cover available.
- routes available to and from the site.
- off-road trafficability.
- time and effort required to assemble rafts and construct bridges.
- capability to provide screening smokes and fire support.
- defensible terrain available beyond the river.
- capability of friendly and enemy observation.
- presence of obstacles on both banks.
- probability that bridge will be compatible with selected site.

Potential crossing sites can be identified from

- maps.
- airphotographs.
- air reconnaissance.
- strategic studies.
- hydrographic studies.
- reconnaissance (long-range patrols, special forces, and friendly partisans).
- or similar sources of information.

Ground reconnaissance must be conducted to refine and confirm information gathered from other sources. FM 5-36 and TM 5-210 contain details on site reconnaissance.

3-38. Raft and Assault Crossing Sites

Raft and assault crossing sites should be dispersed across the crossing front to reduce the risk of losing more than one site (and the crossing units at the site) to a single enemy nuclear weapon. The use of dispersed sites also should cause the enemy to delay commitment of his reserves and force him to disperse his forces and fires.

The number of rafts that can efficiently operate from a particular raft site

varies depending on the characteristics of the river, e.g., width and areas of entrance and exit thereto (table B-2).

Desirable features for raft and assault crossing sites include—

Routes	Existing routes leading to sites or easily constructed access and egress routes from the existing road net to the site capable of handling amphibious vehicles, mobile floating assault bridge equipment, bridge trucks, and armored bridge transporters. If only dismounted forces are to cross, and if there are no roads, helicopters are used to position rafts on the reverse side of the last terrain feature before the river. Then these forces may cross the river clandestinely, thereby gaining surprise.
Approaches	Covered and concealed areas on both shores for vehicles or personnel waiting to be loaded or unloaded.
Banks	Favorable bank conditions requiring minimum preparation for entrance and exit. Exit conditions, especially for amphibious vehicles, are more critical than entry conditions, because less effort and equipment can be deployed to improve exits before an assault. A firm bottom for entering and leaving the water is also desirable.
Width	A narrow portion of the river to decrease round trip time and to reduce exposure to enemy ground fire or aircraft. The planner should realize that river velocities increase at narrow portions of the river. This may offset the advantage gained by selecting this location.
Depth	Sufficient water depth, especially close to the bank, to allow loaded raft to maneuver. If the water depth close to the bank is too shallow, bottom conditions become critical. Minimum changes in water level insure that the river width and the height of banks will remain relatively constant.
Current	Acceptable current velocity. Preferred between 0 and 1.5 meters per second.
Obstructions	River free from snags, rocks, shoals, islands, bars, and other obstructions that hinder crossing.
Assembly sites	Sites existing or easily prepared to provide area at river bank for assembly of rafts.

Rarely are all the above site features met; any deviation must be considered in the planning.

3-39. Fording Sites

A desirable fording site should have—

Routes	• Existing routes on or near sites on both shores.
Approaches	• Covered and concealed approaches to the river. • Approaches should not have overhead obstructions that would be obstacles to tanks with fording kits mounted. • Conning towers may be preassembled, transported, and mounted just short of the river bank if overhead obstructions exist.
Banks	• Suitable bank for entry and exit.
Depth	• Water depth and river bed conditions that permit deep water fording. • The deep-water fording kit adds to the shallow-water fording capability of tanks. • Maximum water depth for fording of vehicles must be obtained from applicable technical manuals. • The river bed must be firm and free of obstacles.
Current	• Acceptable current velocity. Preferred between 0 and 1.5 meters per second.
Obstructions	• Unobstructed crossing area.

3-40. Floating Bridge Sites

The use of approaches, abutments, piers, and anchorages or demolished bridges is a consideration. Anchorage is required for all but the mobile floating assault bridge. When a bridge is built at other than an existing site, the time required for constructing approaches and the anchorage is normally longer. The planner must consider that existing sites may be mined or that the enemy has planned artillery concentrations on them.

Areas, called engineer equipment parks, for the temporary storage of bridge equipment and for the possible preassembly of sections should be available on the near bank 1 to 5 kilometers behind the proposed site. Locations selected should provide concealment and, if possible, cover.

A floating bridge site should have these features:

Routes	Existing routes on or near both shore sites.
Approaches	Approaches that require little preparation.
Banks	Banks stable enough to support the heaviest vehicle—generally no higher than 5 to 6 feet.
Width	A narrow portion of the river, preferably, depending on the maximum anticipated current velocity at that point.

Depth	Sufficient water depth close to the bank to prevent grounding. River bed conditions that permit anchors to hold but not foul.
Current	Velocity between 0 and 1.5 meters per second. Current flow parallel to banks. Reverse currents generally not in excess of 1.5 meters per second.
Obstructions	River free from snags, sandbars, islands, shoals, and large rocks that would hinder crossings.
Assembly sites	Sites existing or easily prepared to provide area at riverbank for assembly of bridge.

Rarely will all the above site features be met; any deviation must be considered in the planning.

3-41. Number and Types of Sites Required

The number and types of crossing sites required for an operation vary with	• the forces participating. • the magnitude of the river obstacle. • the speed desired. • enemy dispositions and capabilities. • the scheme of maneuver. • the crossing equipment available.
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NOTE: This is an example. Do not use it as a hard and fast formula. Consider a corps crossing where the front is 30,000 meters; the river is 100 meters wide; corps has available approximately 1,000 meters of bridging that can be used as either rafts or float bridges; opposing forces have a nuclear capability; and corps plans to attack with two mechanized divisions abreast. If each division crosses with two brigades abreast, one brigade with three battalions and the other with two battalions on line, the following minimum site selections might be made in each division crossing front:

Five battalion assault crossing sites.

Six raft sites with at least one heavy raft at each site.

Two floating bridge sites well dispersed across the front.

Appendix D contains an example of the tactical and technical evaluation of crossing sites.

3-42. Removal of Tactical Bridging

Tactical bridging, both floating and fixed types, is removed when no longer required to support forward tactical units. Essential bridges may remain in place to provide lines of communications until they can be replaced by more permanent structures. Because of their expense and the need to support continued tactical operations, tactical bridging will be replaced expeditiously by lines of communications type of bridging.

Section VI. SUPPORTING UNITS AND OPERATIONS

3-43. Employment of Engineer Units

The engineer force for a river-crossing operation is larger and more complex than for conventional offensive operations. Divisional engineers can perform only a part of the required engineer tasks. Nondivisional engineers are essential for all but the smallest crossing. An engineer brigade, consisting of several engineer combat groups, normally supports a corps in a river crossing.

Division engineer. The role of the division engineer battalion commander as division engineer is particularly important in a river-crossing operation. His knowledge of divisional units and the division's method of operation facilitates recommendations on location, employment, and strength of engineer support. The division engineer is the primary source of technical information concerning crossing sites and should participate in all phases of planning for a river crossing.

Division engineer battalion. The normal and preferred employment of the division engineer battalion is in providing engineer support to assault units on the far bank. Organic engineer companies are placed in direct support of or are attached to the assault brigades. The preservation of the integrity of units and of unit association is particularly desirable for a river-crossing operation. The division combat engineer company that normally supports a specific brigade is habitually employed with that brigade. These companies are employed to breach obstacles on the far bank and to perform other engineer tasks necessary in maintaining the momentum of the attack.

The battalion (minus) is retained in general support. Initially, the remaining engineer companies may be assigned limited, short-term tasks on the near bank, such as improving crossing sites, fords, and approach roads. They may furnish assault boat crews in some crossings.

The organic bridge company is employed primarily to install rafts, particularly if equipped with mobile floating assault bridge equipment. Heavy raft platoons or sections are usually attached to combat engineer companies supporting the assault forces. Organic bridge assets should be released from crossing sites as early in an operation as possible in order that they may move forward with the remainder of the division engineer battalion. The primary mission of the organic bridging company should be the support of forward brigades to cross minor gaps that may otherwise impair advancement on the far shore.

All elements of the division engineer battalion should move across the river as early in the operation as possible to provide engineer support well forward.

Engineer combat group (corps/army). An engineer combat group normally supports an attacking division in a river-crossing operation. The group may be attached to the division or placed in direct support of the division. The group itself is a headquarters that controls and coordinates various engineer units assigned to it.

A typical group organization in support of a division in a deliberate crossing might be as follows:

Engineer combat battalions	4
Floa bridge companies	2
Panel bridge company	1
Light equipment company	1
Dumptruck company	1

Engineer combat battalion (corps/army). Engineer combat battalions are normally assigned the task of supporting the actual crossing and providing support on the near bank. A battalion may be placed in support of an assault brigade or given an area or task assignment. The engineer combat battalion relieves the divisional engineers of near bank support by performing road maintenance, road construction, and raft and bridge construction and by providing crews for assault boats. The battalion progressively assumes responsibilities on the far shore as the attack progresses, thereby releasing the divisional engineers for tasks with the attacking brigades.

Separate companies. FM 5-1 discusses employment capabilities and equipment for the float and panel bridge companies and the light equipment and dumptruck companies.

The employment of engineer forces is derived from the mission of the assaulting force, availability of engineer troops and equipment, and technical characteristics of the water obstacles.

The division engineer is responsible for the technical plans to provide engineer crossing means for the supported division. He determines the engineer assistance required and coordinates engineer support for the crossing.

Missions peculiar to river crossings assigned to engineer units include—

- reconnaissance and selection of raft and bridge, fording, and swimming sites.
- removal of obstacles within and adjacent to the river.
- operation of assault boats for the ferrying of the assault echelon.
- construction and maintenance of footbridges.
- construction and maintenance of rafts.
- construction and maintenance of vehicular bridges.
- construction and maintenance of exits and entrances on the near and far banks.
- assembly, installation, and maintenance of bridge protective devices.
- operation of engineer amphibious vehicles.
- emergency defense of bridge and raft sites.

3-44. Military Police

The organic military police company of a division cannot provide all the military police support required by an assault division during a river-crossing operation. Nondivisional military police units from field army or corps resources should be attached to or placed in support of divisions to support river-crossing operations.

The division military police support the assault units on the far bank by—

- establishing traffic control posts.
- controlling stragglers.
- removing or diverting refugees.
- relieving capturing troops of prisoners of war.

Military police supporting units are normally assigned traffic control functions in conjunction with division military police—

- to prevent the massing of vehicles.
- to provide maximum use of existing roads.
- to insure that priority traffic is expeditiously directed to its final destination.

Control of attached military police will pass to corps or other designated headquarters when division no longer requires their support.

3-45. US Army Security Agency

Elements of the US Army Security Agency (USASA) supporting the division or higher echelon may be employed during all phases of the operation to provide signal intelligence, signal security, and electronic warfare support as cited elsewhere in this manual. USASA support is covered in AR 10-122 and FM 32-10.

Section VII. FACTORS AFFECTING TIME OF CROSSING AND CONSTRUCTION OF BRIDGES AND RAFTS

3-46. Influencing Factors

The following factors influence the time of crossing:

Construction Time. The time required for construction of bridges and crossing of essential combat vehicles may influence determination of the time of attack.

Concealment and Visibility. Night crossings differ from daylight crossings in that more stringent control and coordination are required to prevent concentration of vehicles and equipment at entrances and exits and to prevent accidents while crossing.

Effective use of night vision devices during the movement to the crossing site and over the river should reduce the period when artificial illumination will be required.

Entrances and exits must be marked by lights or other means during reduced visibility so that vehicle drivers or vehicle commanders can detect them.

Readily identifiable or illuminated reference points on the far bank must be available to assist vehicle drivers in maintaining direction.

Marking kits are organic to engineer float bridge companies; additional illumination aids may include vehicle lights, tank-mounted searchlights, flashlights, fire control night lights, chemiluminescent compounds, and weapon fire.

Additional, lighted or illuminated floating markers may be used to mark lanes.

Aids used during night crossings must not impair the vision of drivers or vehicle commanders.

A quarter moon behind the attacker provides the best natural light conditions for the assault. On dark nights, use of artificial illumination enables the attacking force to marshal, to start the assault, and to build rafts and bridges under conditions of comparatively good visibility.

The use of lights for artificial illumination should be carefully timed and tied into the overall deception plan to retain the element of surprise. The importance of surprise, which may be gained under the cover of darkness or during reduced visibility, is weighed against the loss of speed and control.

In modern warfare, concealment from visual and visual-aided observations is generally only one factor. Consideration of concealment from electronic observation and other technical surveillance means is also important.

Nature of Terrain. Open terrain adjacent to the river facilitates the deployment of troops and equipment but offers little cover or concealment unless screening smoke is used. Conversely, closely wooded and rough terrain impedes movement but affords cover and concealment. Thus, open terrain favors a night attack, and closely wooded or rough terrain favors a daylight attack.

Characteristics of River. Swift current, high banks, poor approaches, or tidal water with a mud bottom makes crossings difficult.

Enemy Dispositions and Capabilities. Since enemy operations are somewhat limited by darkness, bridges may be constructed and used at night. Airstrikes can be expected at daybreak and at dusk. The accuracy of surface-to-surface missiles is not limited by visibility. Lanes through minefields on the far bank are best cleared under cover of darkness or during reduced visibility. Such conditions can be created by the use of smoke.

Speed. Speed is important during the advance to the river. Greater speed is possible when the crossing is made in daylight, but this is gained at the direct expense of concealment and surprise. The use of amphibious and fording vehicles and aircraft for delivery of assault troops and supplies permits speed and surprise. If the enemy is retreating, a speedy advance may catch him astride the river. Speed and violence of attack and the confusion that occasionally reigns in battle may permit securing of bridges intact.

3-47. Responsibility for Construction of Bridges and Rafts

The assault force commander orders construction of rafts and light bridges.

The assembly of rafts can usually be initiated earlier than the assembly of bridges because of their reduced vulnerability to enemy fires.

Assembly and operation of rafts should begin as soon after H-hour as possible. Thus, tanks, artillery pieces, and air defense artillery weapons may be crossed before the bridges become operable.

The commander charged with the river crossing, normally the corps or division commander, orders construction of heavy floating vehicular bridges.

The initial advantage of speed in commencing operation of rafts may be more than offset by the greater efficiency of bridges that can be placed in operation in a short time.

Construction of bridges begins as early as possible. Planning for the crossing relies heavily on both bridges and rafts.

In a major river crossing, restricting the use of rafts to the crossing of tanks, heavier artillery, air defense artillery, and other essential equipment during the early hours of the crossing may be desirable. For this purpose, rafts can be used at separate raft sites to provide minimum vulnerability to nuclear attack.

If sufficient MAB equipment is available, consideration must be given to employing it as a bridge early in the operation. Assembly times are shorter when compared to other types of float bridges. In addition, if enemy fires should increase to a level endangering the bridge, the MAB units can rapidly disengage from one another and be reconfigured as rafts until the fires subside. MAB bridges should be replaced as soon as possible by M4T6 or class 60 float bridges to release the MAB equipment for missions with the attacking brigades.

The decision to order the initiation of bridge assembly is crucial and is based on an evaluation of—

The combat, combat support, and combat service support required by forces on the far side of the river.

The amount of bridging available and estimated construction time required.

The availability of suitable fording sites.

The accuracy and intensity of enemy fire to include nuclear, chemical, and biological attacks on the crossing sites.

The risk of loss of the bridgehead if a sufficient combat force cannot be crossed by rafting operations.

The destruction of enemy fire delivery means before and early in the crossing.

The enemy's offensive air capability near the crossing sites.

The effectiveness of smoke and other means to obscure enemy air and ground visual observation and attenuate thermal effects of nuclear bursts.

Doctrinal Recapitulation

An attack on a broad front is preferred over an attack on a narrow front.

The advance to the river in a hasty crossing is so timed that the crossing unit does not pause on the friendly side.

In a deliberate crossing, the LD is the near edge of the river; in a hasty crossing, the LD may be some distance from the river.

The formation in which units cross is determined by the assault force commander; his decision considers the mission, width of the river, terrain characteristics, enemy capabilities, number of entrances and exits, and equipment and troops available.

Once the assault forces land on the far bank, they advance as rapidly as possible toward their objectives; no extensive reorganization is attempted.

Plans must provide for a rate of crossing and buildup on the far bank that exceeds the rate at which the enemy can concentrate against the force.

A bridgehead should provide enough space on the far bank of the river for the combat elements of the crossing force, including the reserve, plus combat support, and essential combat service support elements.

Specific consideration for phasing is given to the severity of the river obstacle, the capability of the assault forces, the distance and terrain between the river and the bridgehead line, and the ability of the enemy force to interfere with the crossing and the advance on the far bank.

In a hasty river crossing, a follow and support unit is usually designated. An element assigned a follow and support mission is a committed force and is no longer a reserve unit.

Planning is developed from the bridgehead line back toward the river line.

The hasty crossing emphasizes speed and aggressiveness and allows subordinate commanders sufficient freedom to exploit success.

Plans for a deliberate crossing generally provide for more centralized control of crossing means, fire support, and crossing times of assault and support elements than for a hasty crossing.

The proper use of air assets can contribute to the speed and success of a river-crossing operation.

Amphibious vehicles are desirable in the assault. Assault boats are used for the assault when sufficient quantities of amphibious vehicles are not available or when the nature of the water obstacle and its approaches and exits prevent their use.

Initially, rafts are employed because their size and mobility make them less vulnerable than bridges to enemy fires.

In a hasty river crossing, the assault force commander is normally provided control of the crossing means needed to insure success of the operation. Retention of control of crossing means by the control headquarters (corps or division) is justified only under exceptional conditions.

The number and types of crossing sites required for an operation vary with the forces participating, the size of the river obstacle, the speed desired, enemy dispositions and capabilities, the scheme of maneuver, and the crossing equipment available.

The engineer force for a river-crossing operation is larger and more complex than for conventional offensive operations. Nondivisional engineers will be essential for all but the smallest crossing.

The employment of engineer forces is derived from the mission of the assaulting force, availability of engineer troops and equipment, and technical characteristics of the water obstacle.

CHAPTER 4

OPERATION PLANNING CONSIDERATIONS (NATO STANAG 2019 and 2088, ABCA SOLOG 28 and 108, CENTO STANAG 2019 and 2088, and SEATO SEASTAG 2019)

This chapter expands guidance contained in chapter 3 on planning and executing a river-crossing operation. The composition and functions of crossing echelons are covered in section I, at battalion level and above. Section II contains field artillery planning and employment at division level and above and outlines the coordination and employment of air defense artillery, again at division level and above. Section III discusses movement planning and control at all levels of command and provides information relative to individuals. In section IV, communication planning, employment, and security are covered at the battalion level and above. In section V, offensive use and protective considerations on the employment of chemical agents and illumination are outlined for division level and above. Section VI includes all aspects of security during all phases of the operation. Section VII contains tactical cover and deception at the battalion level and above. Section VIII provides information on civil-military operations in support of a river-crossing operation. Section IX covers training and rehearsals in preparation for a river crossing.

Section I. CROSSING ECHELONS

4-1. Functional Grouping

For convenience and planning, the river-crossing force may be divided into three basic echelons: assault, followup, and rear. The composition of each echelon varies with the requirement for each river crossing.

4-2. Composition

Assault Echelon

The assault echelon consists of—

- ASSAULT FORCES.
- OTHERS which may be added as available or necessary, e.g.,

<i>Elements</i>	<i>Special parties</i>
Amphibious vehicle	Aidmen
Engineer boat teams	Artillery forward observers (FO)
Aviation	Engineer demolition team

Smoke generation

Liaison personnel

Air control team

Intelligence/sensor teams

Based on the scheme of maneuver and the availability of various types of crossing means, the assault echelons are crossed in waves. The organization of the divisions provides many options in the employment of brigades and task forces to implement the desired scheme of maneuver.

Followup Echelon

The followup echelon consists of reserve combat units, additional engineers, additional field artillery, additional forward area air defense weapons, signal, and military police elements, and combat service support elements, as required, for immediate support of the assault units.

Rear Echelon

The rear echelon is composed of combat service support elements and others whose missions are not directly affected by the river-crossing operation.

4-3. Mission to Units Within the Echelons

Units in the ASSAULT ECHELON establish themselves on the far bank with the mission of securing intermediate objectives, if necessary, and the bridgehead.

All available fire units support the assaulting echelon.

Units within the FOLLOWUP ECHELON are primarily concerned with support of the advancing troops on the far bank. Specific missions may include—

Continuation of the advance.	Passing through or reinforcing the assault troops.
Mopping up.	Completion of mopping up operations on the far bank.
Removal of obstacles.	Removal of bank obstacles bypassed by the assault echelon.
Operation of crossing means.	Relief of division engineer units of responsibilities at crossing sites.
Signal communications.	Installation, expansion, and maintenance of signal communications across the river.
Reinforcing fires.	Reinforcement of the fires of artillery units in the assault echelon.
Defense of crossing sites.	Ground and air defense of crossing sites.
Provision of combat and combat service support for assault troops on the far bank, to include—	• recovery and evacuation of patients to the near bank. • traffic control on both sides of the river.

- recovery, repair, or evacuation of amphibious carriers and fording vehicles disabled in the water.
- assumption of responsibility for prisoners of war and civilian internees, refugees, displaced persons, and other civilians in the area and for removing them from the bridgehead when necessary.

The REAR ECHELON units continue normal operations, primarily combat service support. They cross the water obstacle in accordance with the crossing plan to provide continuous combat service support to the combat elements of their parent organization.

4-4. Employment of Echelons

Assault Echelon

The assault echelon crosses the obstacle with speed and controlled dispersion, maintaining the capability of employing decisive combat power in critical areas. This assault may consist of surface assault forces crossing the river, combined with airmobile assaults. Deployment in depth provides forces to maintain the impetus of the assault.

The tactics of the surface assault forces are usually limited initially to several determined attacks at dispersed locations. The surface assault forces push forward rapidly on the far bank to gain room for maneuver against enemy positions, to secure the crossing sites, and to reduce vulnerability to enemy action.

Every effort should be made to cross tanks early in the operations. When tanks are not included in the initial assault forces, they cover the assault by fire.

When airmobile forces are employed as part of the initial assault, the surface assault forces advance inland as rapidly as possible to link up with the airmobile forces. Speed is essential to keep the enemy forces off balance and to secure the required area before the enemy forces can reorganize and counterattack. On linkup, the forces proceed to secure the bridgehead.

The principles are the same for the control of artillery as for other offensive operations.

Followup Echelon

The grouping of the followup echelon is arranged so that essential vehicles, weapons, and supplies are crossed as scheduled.

Commanders rely on rafts and bridges to cross heavy weapons and equipment and the bulk of vehicles and supplies, and Army helicopters can be used when the situation permits.

The followup echelon must not be crowded at the crossing sites on the near bank, and sufficient control must be maintained to insure proper dispersion in the bridgehead.

These objectives are achieved through a well-planned and well-executed crossing plan and traffic movement and control plan.

Rear Echelon

The employment of elements comprising the rear echelon is derived from the mission of the crossing force. The rear echelon provides continuous combat service support to the assault and followup echelons.

Section II. FIRE SUPPORT

4-5. Fire Planning

Fire plans should provide for—

- | | |
|-------------------------|--|
| Continuous fire support | <ul style="list-style-type: none"> • employing preplanned fires. • attacking targets of opportunity. • emplacing scatterable mines and STANO devices. • using smoke at night (to degrade enemy night observation devices). |
| Interdiction fires | <ul style="list-style-type: none"> • to limit movement of enemy reserves. • to isolate crossing sites. • to isolate successive objectives. |
| Neutralizing | <ul style="list-style-type: none"> • enemy maneuver elements. • enemy fire support means. |

Support to deception plans.

4-6. Fire Support Coordination

The principles, responsibilities, and coordinating measures enumerated in FM 6-20-1, FM 6-20-2, FM 7-10, and FM 7-20 apply to river-crossing operations.

4-7. Field Artillery

The fundamentals of organization for combat covered in FM 6-20-1 apply to employment of field artillery in support of river-crossing operations. Emphasis is on organizing to provide continuous and adequate fire support to committed maneuver elements which is critical during displacement of artillery units across the river. Considerations follow:

- | | |
|--|---|
| Field artillery is positioned as far forward as practicable— | <ul style="list-style-type: none"> • to support the scheme of maneuver including deception activities. • to facilitate the massing of fires in potentially critical areas. • to facilitate rapid, uninterrupted displacement across the river. • to avoid creating lucrative nuclear targets. |
| Assistance in achieving surprise crossing through— | <ul style="list-style-type: none"> • night occupation of positions. • rigid camouflage discipline. • limitations on registration fires and radio communications. |

- Rapid displacement by—
- coordination of patterns of fires with deception plans.
 - appropriate allocation of priorities for use of roads and crossing sites in crossing schedules.
 - use of aerial vehicles for displacement of light artillery.
 - exploitation of amphibious capabilities of light and medium artillery.

4-8. Air Defense Artillery

The river obstacle influences air defense artillery (ADA) support in river-crossing operations because of the restrictions on movement of the attacking ground forces and the natural avenues for low-altitude air attack.

ADA is employed to cover all crossing sites and the bridgehead and yet retain maximum area coverage of the friendly forces in the staging, holding, and dispersal areas. ADA supports the river-crossing operation from positions as far forward as possible. Covering avenues of low-altitude air attack is emphasized.

Redeye and Chaparral/Vulcan units should be employed with the troops approaching the river obstacle and establishing the bridgehead. Hawk units may move up behind the line of departure, possibly deploying to within 10 to 15 kilometers of the near bank, depending on the tactical situation and other ADA support available. Redeye should accompany the assault echelon and Vulcan and Chaparral should close as soon as possible to provide ADA protection of the crossing site. Vulcan may also provide ground fire support. Hawk units should be sent across as soon as a division-size bridgehead has been secured.

Some of the considerations in planning for ADA support of river-crossing operations follow:

- Control difficulties due to restrictions on traffic, communications, and available land area on the far shore. Decentralized control of the forward ADA units will be normal.
- Requirement for special engineer support and Army aviation support for movement of ADA troops and equipment. Bridge sites must be selected for use by the heavier ADA equipment. Rafts may also be used to reduce congestion at the bridge-crossing sites.
- Effect of smoke on visually directed short-range air defense weapon employment.
- Use of ADA radars to aid in demonstrations and feints, through displacement and increased activity.
- In a hasty river-crossing, since the near bank

may not be entirely secured before the assault crossing, security problems may be created for the ADA units supporting the assault elements.

Rules of engagement must be formulated and outlined in unit standing operating procedures (SOP) for the employment of individual, crew-served, and other organic weapons capable of being used against hostile aircraft.

Further discussion of employment of ADA and techniques for organic weapons is provided in FM 44-1, FM 44-1-1, and FM 44-3.

4-9. Close Air and Naval Support

Close Air Support Consideration is given throughout all phases of planning to the information and planning requirements of the Air Force.

Naval Support If the crossing operation is likely to involve the use of naval support, similar attention is given to the Navy's requirements.

Scatterable Mines Areas which should be mined but cannot or should not be mined by field artillery should be considered for mining by aircraft.

Army, Navy, and Air Force commanders and staffs exchange information, coordinate plans, and maintain close liaison.

4-10. Organic Mortars and Antitank and Air Defense Weapons

The use of organic fire support weapons must be coordinated and well planned. Mission, priorities, control difficulties, special support, effect of smoke, STANO devices, and security must be considered when utilizing organic weapons.

Section III. MOVEMENT PLANNING AND CONTROL

4-11. General

In river crossings, as in all offensive operations, movement (surface and air) is planned and conducted to support the scheme of maneuver.

Movement planning for a river crossing must consider the lack of crossing means early in the operation and the fact that crossing sites cause canalization.

Movement plans are prepared to insure the delivery of troops, equipment, and supplies to the right place at the right time and in the best formation and condition to accomplish the mission.

Preservation of unit integrity, availability of cargo and units on landing, and speed of movement are emphasized.

Within the above guidelines, movement planners make the fullest use of transportation means, crossing means, and road nets. To achieve all these objectives, plans for movement must be detailed and flexible, and control of movement must be positive.

Information in this section pertains primarily to surface movement behind the area occupied by the assault forces. Movement in the forward combat areas, as in all operations, is planned, coordinated, and controlled by the assault force commander.

4-12. Concept of Surface Movement Control

When a unit is making an assault crossing, all surface movement of troops, equipment, and supplies over the river, within the units' zone, is controlled from the tactical operations center (TOC).

Depending on the situation, this control is exercised through the assault force commanders, other unit commanders, the traffic headquarters, and the crossing area commanders. Control is established as follows:

- | | |
|---|---|
| During assault | <ul style="list-style-type: none"> • movement over the river is controlled through the assault force commanders. • control of movement behind the assault forces is through unit commanders and the traffic headquarters. |
| At the time when crossing areas are established | <ul style="list-style-type: none"> • movement over the river is controlled through the crossing area commanders. • movement within the areas of the assault forces is controlled through the unit commanders. • movement to the rear of the crossing areas is controlled through unit commanders and the traffic headquarters. • the crossing area commander controls traffic in accordance with the movement plans and the crossing plan. • regardless of scheduling, vehicles move into the crossing area only on call of the crossing area commander. |

Turnover of responsibility from the assault force commanders to the crossing area commanders is by mutual agreement or by direction of the crossing force commander.

The decision as to when an assault force commander *relinquishes control* of the crossing sites to the crossing area commander depends on the situation of the unit and the conditions within the crossing area.

Pertinent considerations for changing control for—	The bridgehead has been secured and enemy contact is broken or sporadic. Counterattacks have been repulsed or are not threatening. Ambushes and/or interdiction of the followup and rear echelon is not imminent.
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As the assault forces move forward, the traffic headquarters controls movement beyond the crossing areas and up to the area controlled by the assault force.

4-13. Crossing Plan

The crossing plan provides for the movement of all elements of the attacking force during the crossing of the obstacle. It is developed in conjunction with other plans, especially those concerned with surface movement to and from the river, air movement, construction and maintenance of roads to and from the crossing sites, and the construction and operation of rafts and bridges (app D).

Specifically, the crossing plan provides for—

Crossing areas.	Delineating these areas.
Crossing sites.	Designating and allocating crossing sites and means to crossing elements.
Fording and amphibious vehicle crossing sites.	Designating and allocating their use to various units.
Rafts and bridges.	Designating the number, type, capacity, location, and time of opening of rafts and bridges to be constructed.
Unit priorities.	Allocating unit priorities for use of the crossing sites and crossing means.
Crossing area commanders.	To include designation of command and passage of control information.
Staging areas and engineer equipment parks.	Designation of these areas and parks as required.
Designation of alternating one-way traffic over bridges.	Established over the bridges only after movement to far bank is adequate to meet the needs of the assault forces.
Designation of one-way routes and the limiting of traffic to the area.	Establishing one-way routes and limiting types of traffic that are authorized to move to the area during the various phases of the river-crossing operation.
Actions and responsibilities if traffic gets ambushed or interdicted by ground and/or air-mobile forces.	Area commanders and convoy commanders must have specific guidance as to reactions and responsibilities if the convoy is ambushed or interdicted. Control of the reaction forces and the fire support must be delineated before the operation.

4-14. Traffic Headquarters

Traffic headquarters is an operating and planning agency delegated authority to plan, schedule, route and monitor the movement of traffic.

The traffic headquarters should be collocated with the crossing force's TOC.

The traffic headquarters must work closely with elements of the unit's staff.

In a river-crossing operation, the traffic headquarters places priority on—

Assisting the crossing force staff.

- in developing priorities for movement.
- in use of routes by elements of the crossing force, to include, its attached and supporting units.

Allotment of times and routes.

establishing and disseminating a provisional allotment of times and routes of movement to units.

Consolidating road movement tables.

Scheduling highway movements.

Preparing the crossing force road movement graphs and tables ¹

based on the crossing plan.

Preparing the traffic circulation plan, which identifies the road net and includes—

- classification.
- direction of movement.
- bridge and raft capabilities.
- other route restrictions.
- staging areas.
- holding areas.
- traffic control posts.
- engineer regulating points.
- traffic regulating lines.

Monitoring traffic movement.

throughout the unit area, exclusive of the forward combat zone.

Providing procedures for changing routes, schedules, or priorities.

as directed by the TOC.

The division transportation section provides the nucleus of traffic headquarters at division. The section requires augmentation of additional movement and administrative personnel and support to operate the traffic headquarters. If individuals with the required skills are not available from the cellular units in TOE 55-540 or field army sources, personnel from within the division are trained and used.

The division signal battalion provides the traffic headquarters with communication support; the division military police company provides assistance in controlling the flow of traffic (para 4-17).

FM 55-10 and FM 100-10 provide details of the operation of traffic headquarters.

4-15. Crossing Area Commander

The crossing force commander designates a commander for each crossing

¹ FM 55-30, FM 55-10, and TM 55-310 provide details on preparation and use of the road movement graphs and tables that are a part of the surface movement annex to the crossing plan.

area. The crossing area commander may be an assistant division commander or a subordinate unit executive officer in a critical area.

The crossing area commander is primarily responsible for ²—

- insuring optimum flow of traffic across the river within his area.
- insuring that only essential personnel and equipment are in the crossing area.
- coordinating the defense of the area and for coordinating counterambush/counterinterdiction actions within the area.

The crossing area commander acts in close coordination with

- TOC.
- senior engineer in the crossing area.
- commanders of elements to cross in his area.

The crossing area commander is vested with authority to exercise absolute control of the crossing means within the area and the traffic while located within the area (fig 4-1).

4-16. Traffic Regulating Line

A traffic regulating line is a control measure used to delineate areas of responsibility for traffic regulation and control as exercised by different elements of command (fig 4-1).

A traffic regulating line to supplement normal control delineated by unit boundaries may be established immediately to the rear of the reserve and trains areas of the assault brigades to limit the brigade commander's responsibility for traffic control to his rear.

A traffic regulating line may be established on either side of the river to delineate the traffic regulation and control responsibilities of the crossing area commander.

Other traffic regulating lines may be established to facilitate the control of vehicular density throughout the division and to indicate the forward limit of corps' area of responsibility for traffic regulation.

Traffic regulating lines should be established along easily defined terrain features or manmade features.

4-17. Traffic Control Posts

Military police at traffic control posts (TCP) within the area of an assaulting division perform their normal functions of traffic control by enforcing traffic rules and providing information and directions.

In a river crossing, these TCP also assist in traffic regulation by reporting to traffic headquarters on the movements of units and convoys. TCP may also relay messages between traffic headquarters and moving units. TCP are located on both banks of the river to control traffic moving toward or away from the river and normally are located at the following specific points:

² Paragraphs 4-12 and 4-23 indicate further responsibilities of the crossing area commander.

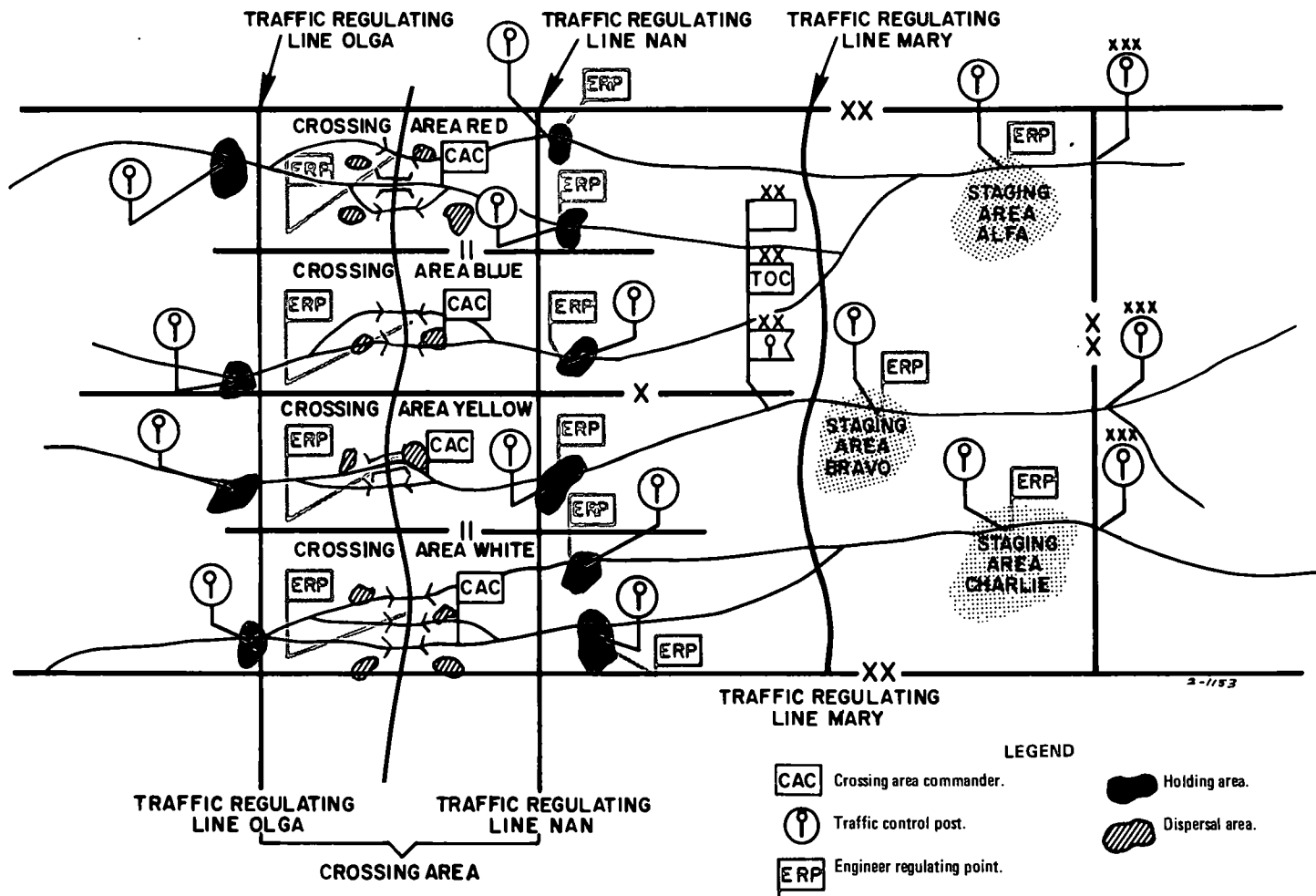


Figure 4-1. Traffic facilities for a river crossing.

Major crossroads and road junctions	along the main supply route and near division rear and lateral boundaries where uncontrolled entry of traffic from adjacent unit areas could interfere with division surface movements.
Staging areas	at principal entrances to and exits from staging areas.
Holding areas	at entrances and exits.
Critical crossroads and road junctions	across the river and within or beyond crossing areas.
Engineer regulating points (ERP).	

4-18. Staging Areas

Staging areas are waiting spaces for convoys designated to cross the river (fig 4-1) and are located far enough from the river to facilitate rerouting and use of the alternate roads to raft and bridge sites.

Areas selected for staging require	• cover and concealment. • easy accessibility. • sufficient area for vehicle and equipment dispersion.
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Staging areas are used by corps and army units that support the division and cross in the division zone.

Staging areas are designated by traffic headquarters in the traffic circulation plan. Movement to and out of staging areas is according to planned times and is controlled by the TCP's.

Normally, all troops and their accompanying vehicles, except units detailed to support the assault from positions forward of the assembly areas and reconnaissance elements, assemble in the staging areas and move forward, when ordered, under unit control through assembly areas to the river. Units move into the staging areas according to their mission in the crossing plan, regardless of their previous functions during the advance to the river.

4-19. Holding Areas

Holding areas are waiting spaces near crossing areas to handle vehicles should a sudden interruption occur in the movement of traffic across the river (fig 4-1). Vehicles move into these areas and disperse rather than stand on the roads and restrict the flow of traffic into crossing areas.

Holding areas are normally sited just outside the crossing areas in locations with access to all principal roads leading to the crossing sites. Holding areas must be established on the near and the far banks. Holding areas on the far bank may be used to temporarily hold and reassemble unit convoys that are utilizing various crossing means before continuing movement.

Depending on the availability of terrain, these holding areas are located

to facilitate traffic into and out of the areas consistent with the principle of maximum flow, minimum control.

Holding areas are normally established and operated by military police as provided for in the traffic circulation plan and as directed by the crossing area commander in exercising his responsibility (para 4-15).

4-20. Dispersal Areas

Dispersal areas are spaces located within crossing areas and along the roads leading to the bridge and raft sites. Dispersal areas provide space where vehicles can be halted and dispersed to avoid congestion on the access roads to the crossing sites when the flow of traffic has been disrupted or there is a reduction in the capability of the crossing means. The dispersal area detail operates under the crossing area commander and is in constant communication with him.

4-21. Engineer Regulating Points

ERP are located near or within staging areas, holding areas, or crossing sites where technical checks are made to insure that vehicles crossing the river match the capability of the crossing means and to determine the load-carrying capacity of the crossing means (fig 4-1). Personnel at the ERP may also assist the traffic headquarters and crossing area commander in maintaining maximum traffic flow. Engineer personnel operate the ERP. The crossing area commander controls the ERP within the crossing areas; the traffic headquarters has operational control of all other ERP. The ERP is located sufficiently far from the river to allow flexibility in routing of vehicles to appropriate sites.

At ERP outside the crossing areas—

- Vehicles are examined to determine correct load classification.
- Vehicles are inspected to insure proper loading with respect to technique and dimensions.

At ERP on the crossing site—

- The load-carrying capacity of each of the crossing means is determined.
- This information is kept current and is regularly disseminated to traffic headquarters and the crossing area commanders.
- Crossing area commanders use this information to reroute traffic when technical difficulties or enemy action renders a crossing means inoperable or reduces its capacity.

4-22. Engineer Equipment Parks

Engineer equipment parks are areas normally at least 1 kilometer behind bridge and raft sites for the assembly of engineer vehicles, equipment, and materiel to be used during the crossing operation. Empty engineer bridge vehicles should be moved away from the river and crossing areas as soon as practicable. Equipment parks should be located to prevent congestion of traffic leading to the crossing areas.

4-23. Movement Control

Crossing control officers are designated to assist in the control of units during a crossing. They assist the crossing area commander in maintaining an uninterrupted, orderly movement across the water.

Each crossing unit designates a crossing control officer who maintains contact with the crossing area commander.

Listed below are certain control techniques that, if used by the crossing control officer, will expedite the flow of traffic across the river—

- | | |
|--|---|
| Designating and marking certain vehicles and equipment | such as command, communication, ammunition, and ambulance vehicles to insure high priority of movement on the road net and on the crossing means. |
| Plainly marking convoys | with their priority and serial number so that markings can be read from the air and the ground. |
| Assigning an overall priority to each element scheduled to cross the river | to assist in maintaining a proper order of movement if some of the crossing means are destroyed. |
| Restricting the flow of traffic returning from the far bank | in early stages of the operation. |
| Limiting essential returning vehicles or personnel | to crossing on rafts or to being moved by helicopter. |

4-24. Recovery

Listed below are certain recovery techniques that, if used, will facilitate the recovery of disabled vehicles during the crossing:

- | | |
|--|---|
| Maintenance personnel and equipment located near the crossing site | to assist in recovery of stalled or sunken vehicles. |
| Engineer personnel in boats | may be used during crossings to recover personnel and to assist in the recovery of vehicles, when available and as the situation permits. |
| Helicopters to recover personnel | can be used to evacuate personnel while the vehicle is waterbound. |

Unit SOP's should contain established procedures for personnel to follow when vehicles encounter difficulty in crossing.

Recovery operations begin as soon as the tactical situation permits.

Section IV. COMMUNICATIONS

4-25. General

In a river crossing, reliable communications are necessary for continuous coordination and for efficient employment of the large number and variety of supporting units peculiar to this type of operation. All available means of signal communication may be required to insure reliable contact.

The geographical distribution of radio nets associated with river-crossing operations and their peculiar communication patterns can provide significant indicators of plans and preparations for these operations. Therefore, special emphasis should be on signal security and electronic countermeasures in all phases of the operation. The enemy must be denied the information that he needs to react effectively and in strength against the crossing force when it is vulnerable to counterattack. Enemy attempts at disrupting command and control by degrading communications through electronic countermeasures must be defeated by applying sound communications security practices and appropriate electronic counter-countermeasures. Electronic warfare is discussed in FM 32-20, FM 61-24, and FM 61-100.

Communication planning is continuous and is concurrent with tactical planning. The communication plan is developed to support the scheme of maneuver and should provide for the use of multiple means. Communication orders are published in the communications-electronics annex to the operation order. Plans must include provisions for the use of and defense against electronic countermeasures. Specific instructions are normally set forth in the electronic warfare annex; if none is published, they are included in the communications-electronics annex.

Just before a deliberate crossing, the use of radio may be restricted to permit security and surprise. Maximum reliance initially will be on wire communication, supplemented by messenger. After the assault begins or during a hasty crossing, greater reliance must be on radio, visual, and sound communications within the bridgehead area during the assault. As soon as operations on the far bank permit, brigade signal teams and forward area signal centers are expeditiously deployed across the river to reestablish normal command control communications. FM 11-50, FM 11-57, and FM 24-1 contain further discussions of communications.

Units, such as the engineers and military police, that will have increased communication traffic for this type of operation must establish and maintain their own radio and wire nets and also maintain communications in the crossing force command net.

4-26. Special Communication Requirements

Communications are established and maintained between the crossing area commanders and—

- the engineer.
- security units at the crossing sites.
- the TCP in the staging and holding areas.

- the division TOC.
- traffic control headquarters.

The division signal battalion provides communication equipment support for the crossing area commanders. Supplementary signal support may be required.

Engineer units usually can control their own elements and enter the nets of supported units with organic communication equipment. Military police elements operating traffic control posts can, with organic equipment, perform their normal function of traffic control. These elements may require equipment support to maintain contact with traffic headquarters in monitoring the movement of traffic.

4-27. Communication Means

Wire Communications

Wire should be used extensively as conditions permit. Units establish and operate wire facilities when feasible. Normally, sufficient telephone circuits exist between the forward area signal centers and division main by means of radio relay. Wire circuits are extended from the forward signal centers to provide direct access from division TOC and traffic headquarters to the crossing area commanders and to key TCP at holding areas and crossing sites. If time permits, lateral lines are established between fixed TCP and crossing area commanders, providing greater reliability through alternate routing. Wire is extended across the river at the earliest practicable time. Wire teams from higher headquarters augment the division wire capability to install an extensive wire system.

Radio Communications

Special movement control radio nets serve as a primary means to control and coordinate the crossing of units during the assault. Examples of special nets follow.

Crossing area commander's net (FM)

This net should include the crossing sites within the crossing area, traffic control points, engineer units, and major crossing units that enter the net while in the crossing area.

Division movement control net (FM)

Traffic headquarters acts as the net control station. Operating within the net are the division TOC, the crossing area commanders, and the TCP in the staging and holding areas.

Messenger Service

The crossing area commander's attached engineer and military police units must be included in the scheduled messenger service. Special motor and air messengers should be available for direct priority communications that cannot be transmitted electronically.

Section V. CHEMICAL AGENTS AND ILLUMINATION

4-28. Chemical Agents

River-crossing operations provide opportunities for the effective employment of chemical agents by both the attacker and the defender. Personnel taking part in this type of operation must be protected against enemy chemical attack.

The defender can use chemical agents to increase the obstacle effect of the river. He also can use them against attacking troops concentrating before and during the crossing.

The attacker can use chemical agents to assist in reducing the defender's ability to maneuver his counterattack force and in restricting his use of concealed areas with good observation and fields of fire to the front or flanks of the crossing force.

4-29. Artificial Illumination

In a night assault crossing, artificial illumination may be used to disclose enemy positions; to blind the enemy; to assist maneuver of the assault elements, including airmobile forces; to facilitate adjustment of observed fires; and to deceive the enemy. In a night crossing when surprise is important, artificial illumination is used only after the assault has been launched and surprise has been lost. The use of artificial illumination can facilitate construction of rafts and bridges at night if the exposure of this activity can be denied the enemy. FM 20-60 contains details on artificial illumination.

Section VI. SECURITY

4-30. Flank Security

During the river-crossing operation, requirements for flank protection are the same as for other offensive operations. Means of providing or improving flank security include—

- Tying the bridgehead line in with the river obstacle.
- Air and ground surveillance.
- Echelonment of maneuver units.
- Retention of reserves prepared for rapid deployment overland or by airmobile means.
- Use of follow and support elements to contain or destroy bypassed enemy forces.
- Employment of tactical fighter aircraft or armed reconnaissance flights.
- Early planning for prompt fire support for units on the flanks.
- Advancing rapidly to disrupt enemy defenses.
- Threats against the enemy's rear areas.
- Denying the enemy time to mass forces for counteractions.

- Use of scatterable mines.
- Use of STANO devices.
- Use of smoke during day and night.

In hasty crossings, the advantages gained by maintaining the momentum of the attack may justify accepting greater risks and employing relatively small forces to protect the flanks of the crossing force; but the danger of defeat in detail when elements of the force are separated by a major obstacle must be considered.

In deliberate crossings, forces on flanks must be strong enough to repel or stop enemy attacks while the crossing force is astride the river. Flank security forces may be reduced when friendly adjacent or following forces are disposed to provide prompt assistance in neutralizing enemy attacks.

4-31. Crossing Sites and Bridge Equipment Parks

In addition to the normal requirements for local security, crossing sites and engineer equipment parks must be defended. Rafts and bridges at the crossing sites need protection against ground and air attacks and waterborne hazards such as floating mines, rivercraft, swimmer demolition parties, or similar devices that could destroy the crossing means. TM 5-210 contains details on systems to protect rafts and bridges against waterborne hazards.

Initially, the assault forces provide local security of the crossing sites (para 3-12); however, succeeding units relieve the assault forces of this responsibility as soon as possible. When responsibility for a crossing area passes from the assault commander to a crossing area commander, the latter assumes responsibility for defense of the sites within his crossing area. When the bridgehead is secured, the crossing sites are, in effect, secured from enemy counteraction by the entire crossing force on the far bank.

The crossing area commander develops his basic defense plan using the forces normally available in his area on a continuing basis. These forces are primarily the nondivisional engineer units working on or along the river. The crossing area commander may, on an emergency basis, also make use of forces passing through his area. Should the situation warrant, combat elements would be provided to assist in the defense of the crossing sites. Plans provide for field artillery support and air defense of the crossing area, and arrangements are made for other combat and combat service support. Means are provided for direct communication between the commanders of the crossing area defense and the corps artillery fire direction center, particularly after divisional artillery has crossed the river. Every means, to include smoke, is employed to prevent the enemy from delivering accurate fire on the crossing sites.

4-32. Clearing the Near Bank

In a hasty crossing, the near bank of the river may not be cleared before the assault forces move across the obstacle; emphasis is on sustaining the momentum of the attack and crossing where enemy opposition is weakest.

Assault forces should clear the near bank of any enemy forces that could seriously interfere with accomplishment of the mission.

In a deliberate crossing, the near bank is cleared of enemy forces before the assault of the river.

4-33. Mopping Up

Mopping up on the far bank of the river and the advance inland are concurrent operations. The assault units must maintain the impetus of the attack, leaving mopping up tasks to specific units of the reserve or follow and support units. When the assault echelon elements are required to mop up, they are relieved of this duty as soon as possible. Organic or attached reconnaissance units may be assigned mopup tasks. Mopup responsibility must be specifically assigned in orders.

4-34. Defense Against Air and Missile Attack

All crossing areas must be defended from air and missile attacks. Bridge sites are particularly susceptible to these attacks because of their static nature and importance. Smoke may be used to provide concealment during assembly and installation and after the bridge is opened to traffic. However, smoke may impair the effectiveness of direct fire weapons.

The use of organic automatic weapons and small arms against low-flying, hostile aircraft must be recognized in providing air defense protection of river-crossing operations.

Commanders should plan to employ both active and passive measures for defense against air attack.

Active air defense
means include

- organic and attached air defense artillery weapons.
- organic automatic weapons.
- small arms.
- electronic countermeasures (ECM) such as jamming and manipulative deception.

Passive air defense
means include

- dispersion.
- cover.
- concealment.
- camouflage.
- deception.
- mobility.
- electronic counter-countermeasures (ECCM) such as antijamming techniques.

Section VII. TACTICAL COVER AND DECEPTION

4-35. General

Tactical cover and deception measures are employed to deny the enemy accurate knowledge of the composition and activities of friendly forces and to deceive him as to the disposition, movement, composition, and plans of the crossing force. Concealment, the use of demonstrations and feints,

and the timing and coordination of all deception activities are specifically emphasized in a river crossing. Major deception activities are conducted only on the authorization of the crossing force commander; however, in a hasty crossing, a division or brigade should be given authority to conduct activities such as local feints and demonstrations. A commander planning the use of deceptive techniques should consider the impact of additional troops and equipment requirements on his primary crossing operations.

Concealment

Concealment of troops and equipment is essential during preparation for the crossing. Concealed areas should be selected for—

- troop assembly.
- fire support positions.
- supply storage.
- parks for equipment and vehicles.

Concealed locations should be as far back from the river as permitted by the mission and time required to move to the river. When feasible, necessary movements of equipment and personnel should be conducted at night or during limited visibility, and all movements should be coordinated with the deception plan.

Demonstrations

Demonstrations supporting a river crossing are made in areas other than the actual crossing areas. Demonstrations should duplicate activities normally associated with a river-crossing operation, e.g.,

- Movement of troops into forward assembly areas or attack position.
- Movement of weapons and equipment such as tanks, artillery, air defense weapons, and engineer equipment into forward areas.
- Delivery of nonnuclear (to include chemical) fires into areas where no decision is sought.
- Use of friendly air activity and the use of smoke.
- Employment of special deception units.
- Employment of psychological operations media, such as leaflets and loudspeaker broadcasts.
- Use of friendly guerrilla forces to conduct diversionary operations.
- Use of communication deception.

Feints

Feints in the form of limited objective attacks to include airmobile raids across the river may be used to destroy/disorganize the enemy's command

and control facilities/systems, to cause him to delay commitment of his reserves, to disclose his dispositions, or to commit them prematurely or in the wrong area. Feints may be so planned, timed, and executed that if the feinting troops gain a decided advantage, their success can be exploited. Feints may be accomplished by jamming operations to add importance to the ruse or secondary attack or feint. The major unit (division commander or higher) authorizes a feint.

Ruses and Displays

The use of dummy positions and decoy equipment, the establishment of false radio nets, and the employment of sonic or electronic simulators may result in misleading the enemy as to the time and place of the crossing.

Plans

Tactical cover and deception plans are prepared for both hasty and deliberate crossings. These plans integrate all cover and deception activities to present to the enemy a total picture that will induce the desired reaction. Plans for a deliberate crossing usually will be more detailed and will involve the use of more means than plans in support of a hasty crossing. Plans should include, where practicable, jamming and/or electronic deception of enemy sensors used for surveillance of the area of operations.

4-36. Smoke

Smoke may be used to conceal preparations for the crossing, the crossing itself, and to assist in the deception plan. Skillful use of smoke confuses the enemy and may cause him to shift his fires to unremunerative targets and to commit his reserves against other than the principal crossings. Smoke may be used in conjunction with feints and demonstrations to conceal the forces involved or to present an appearance of an activity that does not actually exist. Smoke screens can be used to divert enemy attention and draw fire. When deception is desired, the density and extent of the smoke to be maintained should be equal to that employed in the actual area of operations. Smoke should be considered for use at night to degrade the effectiveness of the enemy's night observation devices. See figure 4-2.

The use of smoke to obscure enemy air and ground visual observation of

- troop and equipment assembly areas.
- weapon positions.
- combat service support installations.
- crossing means.
- crossing sites.
- objectives to be secured by airmobile assault.

When enemy air attack is unlikely, a smoke curtain between friendly and enemy forces may be sufficient if it entirely obscures enemy ground observation. If the enemy can observe a large area, a haze may be required. When air attacks are likely, a heavy smoke blanket may be necessary. Smoke also attenuates the thermal effect of nuclear bursts; therefore, an

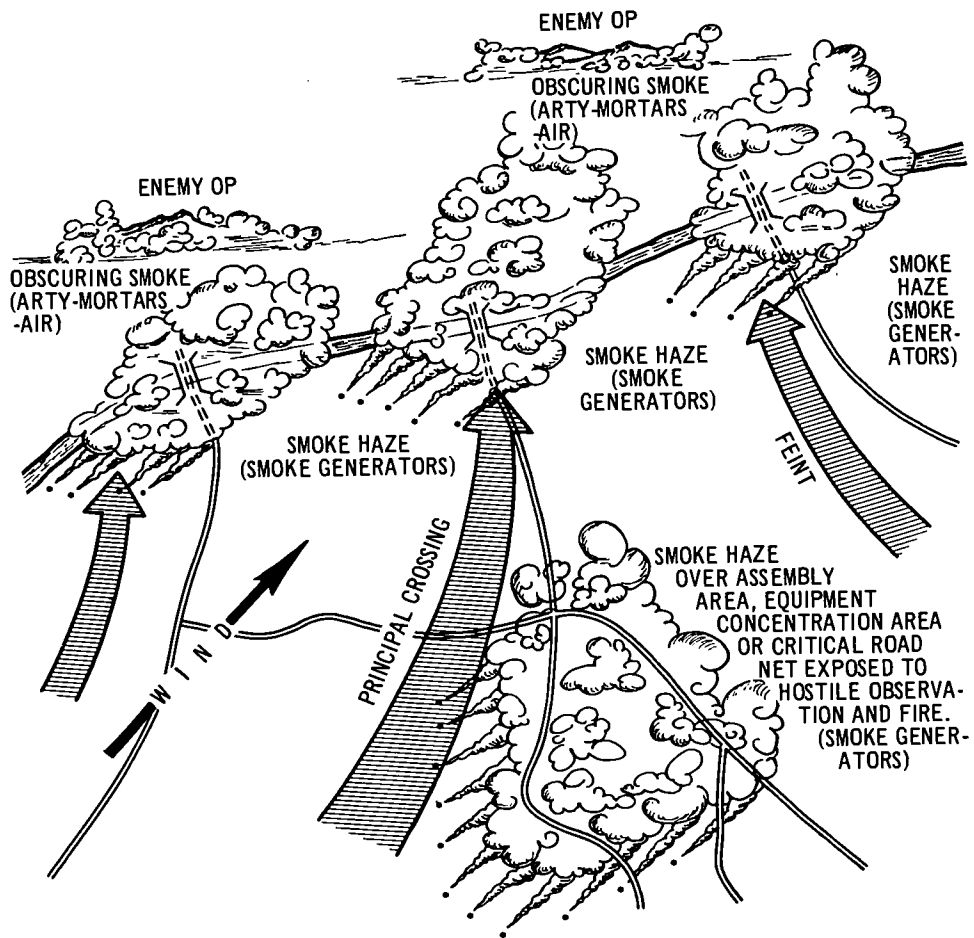


Figure 4-2. Smoke screens used for concealment and to deceive the enemy as to the exact location of the crossing.

increased use of smoke may be necessary during nuclear warfare. (See FM 3-50 for smoke operations.)

Some other factors considered in using smoke follow.

Adverse weather conditions

especially high winds, may nullify the use of smoke. The commander needs accurate weather forecasts. Smoke generators and smokepots are sited to take maximum advantage of prevailing and predicted winds on actual and dummy crossing sites.

The size of the area

covered by smoke should exceed that actually required for the preparation and assault. Smoking only small areas may assist the enemy in massing artillery fires and directing airstrikes on likely areas concealed by smoke. Smoking large areas serves to confuse the enemy as to the intended site of the crossing and permits maximum dispersion.

Demands of friendly ground and air observation	may conflict with the need for denying the enemy observation. Target areas for airstrikes and landing areas for airmobile forces should be clear of smoke at the right times.
Minimal interference	with operations of friendly flank units.
Means for area screening	should be established early on the far bank.
Enemy's reactions	to the smoke and his resulting countermeasures should be observed and considered.
Adequacy of the smoke	is determined by periodic checks from the air. Air observation or prepositioned ground reconnaissance elements, e.g., long-range patrols, are effective means for checking haze-type smoke.

4-37. Timing

Timing and integration of the measures discussed above into the deception plan are important. A detailed schedule for each phase of the plan is necessary. To be effective, various measures are combined to provide realism. For example, the use of sonic simulators to portray tanks moving into an area is combined with radio activity and decoy tanks. This precedes the actual assault so as to permit enemy reaction. Too much time intervening between the deceptive action and the actual assault assists an alert enemy to determine the nature of the threat and to move his forces to oppose the crossing. To accomplish its purpose, the deception plan must induce the desired enemy reaction.

If the scale of the operation requires great activity in the selected crossing areas on the near bank, the appearance of similar activity may be duplicated at other points along the crossing front. All activity on the near bank and demonstrations along the river are carefully timed to cover the movement of troops and equipment, registration of fires, near bank reconnaissance, and work for the actual crossing.

4-38. Communication and Electronic Deception

Before a crossing, electronic, wire communications, and communication deception may be used to assist in obtaining surprise as to the time or place of crossing (FM 32-10 and FM 32-20).

Section VIII. CIVIL-MILITARY OPERATIONS

4-39. Interruption of Local Economic Activity

River-crossing operations should avoid build-up, populated areas when possible. Governmental internal security, economic, social, psychological civic, and intelligence services must continue with minimal interruptions during the river-crossing operation. Military restrictions imposed because of river crossings should be explained by use of psychological operations media. Leaflets, posters, and loudspeaker broadcast operations can assist in the control and movement of the civilian population.

4-40. Control of Civilian Movement

Rigid control of the movement of civilians is necessary. Civilians living in the near-bank area and those living in the bridgehead area are kept in place unless particular requirements of the situation necessitate the evacuation of limited areas. Refugees and local civilians, if necessary, are quickly moved away from the river to designated areas in the rear of the staging areas. Displaced persons will be moved from the area as soon as the tactical situation permits. Civilians on the far bank are not allowed to assemble in the crossing areas during movement to the rear. They are crossed promptly by planned evacuation routes. Foot bridges or light rafts may be established to insure rapid passage to the rear. Separate routes are established and controlled to avoid congestion of main troop and vehicular routes. Civilians are not allowed to cross the river from the near bank to the far bank or to move along the river line. The relatively limited area of the bridgehead and the concentration of combat units within the bridgehead may require partial or total evacuation of civilians. The enemy can be expected to use the civilians as an obstacle to operations within the bridgehead.

The following special considerations may apply in control of civilians during a river-crossing operation.

- Security screening of civilians should be accomplished before evacuation to prevent espionage or sabotage of crossing sites. Civil affairs teams and counterintelligence elements perform this function.
- The use of civilian vehicles for evacuation will further congest the crossing areas. FM 41-10 provides guidance for control of civilians.

Section IX. TRAINING AND REHEARSALS**4-41. Training**

Units participating in river crossings should receive specialized training. This training permits units to ready their equipment, to complete basic loads and prescribed loads of supplies, and to learn crossing techniques. Commanders must evaluate safety procedures used in training compared with requirements for safety during combat operations. Plans must include provisions for the supply, distribution, and handling of life preservers if the crossing force is to use them during rehearsals or operations.

A unit SOP should be established to provide overwater safety procedures.

FM 5-144 provides guidance for crews and passengers when operating in water in amphibious vehicles.

Appropriate technical manuals describe requirements for operation of types of amphibious vehicles in water.

4-42. Rehearsals

Rehearsals, based on the actual operation and administrative/logistics plan, improve coordination between the troops making the crossing and all supporting troops. When possible, units draw special equipment required to conduct the crossing and train in the use of this special equipment.

Doctrinal Recapitulation

Organization of field artillery for combat emphasizes providing continuous and adequate fire support to committed maneuver elements, which is critical during displacement of field artillery units across the river.

Early displacement of fire support units across the river is vital to support of a rapid advance beyond the river.

ADA is employed to cover all crossing sites and the bridgehead and yet retain maximum area coverage of the friendly forces in the staging, holding, and dispersal areas.

In ADA employment, covering avenues of low-altitude air attack is emphasized.

ADA supports the river-crossing operation from positions as far forward as possible.

Organic fire support (both direct and indirect) must be well planned and used extensively.

STANO devices, smoke, and scatterable mines should be used when practicable.

The river-crossing force may be divided into three basic echelons: assault, followup, and rear.

The assault echelon crosses the river with speed and controlled dispersion, maintaining the capability of employing decisive combat power in critical areas.

The grouping of the followup echelon is arranged so that essential elements or items are crossed as required for immediate support of the assaulting unit.

The rear echelon crosses the river, as required, to provide continuous combat service support to the assault and followup echelons.

In river crossings as in all offensive operations, all movements—surface and air—are planned and conducted to support the scheme of maneuver. During the assault, movement over the river is controlled through the assault force commanders.

Once the crossing areas are established, movement over the river is controlled through the crossing area commanders.

Movement behind the assault forces is controlled through unit commanders and the traffic headquarters.

The assault force commanders turn over responsibility for crossing areas to the crossing area commanders by mutual agreement or by direction of the crossing force commander.

The crossing plan provides for the movement of all elements of the command (organic, attached, and supporting) crossing the river; it is based on the scheme of maneuver, the availability of crossing sites, and the availability and capability of crossing means.

Traffic headquarters is an operating and planning agency of the crossing force delegated authority to plan, schedule, route, and monitor the movement of traffic.

The crossing force commander designates a crossing area commander for each crossing area.

During river-crossing operations, the communication plan is developed to support the scheme of maneuver and it should provide for the use of multiple means.

During a river-crossing operation, communication requirements will increase. The problem of communications security will also increase, especially if surprise in the crossing is desired.

River-crossing operations consider flank protection, local defense of crossing sites, defense against air and missile attacks, and tactical cover and deception activities.

CHAPTER 5

COMBAT SERVICE SUPPORT PLANNING AND EXECUTION (NATO STANAG 2019, ABCA SOLOG 28, CENTO STANAG 2019, SEATO SEASTAG 2019)

Section I. BASIC CONSIDERATIONS AND SUPPLY PLANNING

5-1. Basic Considerations

Insuring continued combat service support when assault forces are separated from their support installations by the river and minimizing congestion in the crossing area are emphasized.

Planners should anticipate and plan to counter

- the effects of losses of supplies, equipment, and key personnel.
- delays in rafting operations and bridge construction.
- enemy interference with both surface and air movements in rear areas and in crossing area.
- limitations on two-way traffic on roads.
- changes in weather conditions.

Combat service support planning must also consider the increased combat service support requirement of river-crossing operations.

Maintenance should be expedited in preparation for crossings. Mobile teams should be available in crossing areas to accomplish emergency equipment repairs to minimize delays. Communication equipment and weapons will also require an additional maintenance effort.

River-crossing operations require special considerations for supply, medical support, and use of transportation means.

For a passage of lines, the combat service support facilities of the unit being passed through are used to the maximum.

River-crossing operations require that the combat service support installations be echeloned forward to support the operation for the maximum time without displacement after the attack is launched. Support then can be given continuously to maintain the momentum of the attack.

The principal consideration in locating the combat service support installations is the ability of the individual installations and activities to perform their assigned missions. After that, dispersion and defensibility are considered. Defensibility must be balanced against the dispersion necessary to prevent simultaneous destruction of adjacent installations. Although dispersed logistic installations do not normally present lucrative

targets for nuclear or chemical weapon attacks, these installations must habitually employ passive defense measures to reduce exposure and vulnerability to such attack. These passive measures include—

Dispersion between installations	consistent with the ability to perform their assigned mission and to satisfy requirements of local defense and passive air defense.
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Cover and concealment taking maximum advantage of terrain.

FM 54-2 and FM 100-10 provide further details of combat service support procedures and responsibilities.

5-2. Supply Planning

Critical supplies, when required by the assault forces, are delivered to the far bank of the river. In the early stages of the operation, airlift may carry much of the supply tonnage to distribution points established on the far bank. Aircraft may be used to deliver airland supplies across the river or to airdrop supplies into the bridgehead. Additional supplies can be transported across the river by assault boats, rafts, or amphibious vehicles; supply can be accomplished through the use of preloaded vehicles that cross by air, raft, or bridges as soon as practicable after the initial assault.

Plans provide for—

Early establishment of supply storage areas or distribution points and means for their control on the far bank.

Increased quantities of class V for preparatory fires and the assault.

Units crossing the river with basic loads intact.

A high priority in movement plans for ammunition supply vehicles.

Increased ammunition expenditures for weapons employed for air defense.

Establishing mobile ammunition supply points on the far bank early in a river-crossing operation.

Providing minimum stock levels of critical supplies adequate to insure continued operation if traffic is interrupted when crossing the river.

Early establishment of water supply points on the far bank.

The buildup and control of stock levels to support further offensive operations.

Prompt relief in critical supply situations that may occur.

A reserve in engineer equipment that is necessary to insure continued operation of the vital river-crossing means.

Placement of reserve stocks of engineer bridging material in equipment parks near bridge and raft sites.

One or more petroleum, oil, and lubricants (POL) distribution points in the bridgehead to be established promptly.

Providing mobile fuel tankers a high priority in crossing the river on rafts or bridges, as appropriate.

Temporary small-diameter pipeline and hoseline systems to serve the far bank.

The increased requirement for repair parts associated with equipment used in swimming and fording operations.

Section II. MEDICAL SUPPORT

5-3. General Considerations

All medical personnel organic to units crossing the river cross with their supported units. Combat battalion aid stations are established in the bridgehead as early as possible to provide treatment and reduce cross-river evacuation. Division medical battalion ambulances accompany medical platoons of the assault battalions when feasible to expedite evacuation. Designated boats, rafts, amphibious vehicles, and aircraft evacuate patients from the far bank early in the operation to prevent excessive buildup of patients in far-shore treatment stations. FM 8-15 contains general medical considerations.

5-4. Clearing Stations

Division clearing stations and supporting hospitals are sited to cross the river as early as practicable. Echeloned displacement or the leap-frog technique may be used to displace clearing stations. Control of division-level medical operations is initially decentralized to supported brigades, but reverts to the medical battalion as soon as communications and rear area protection permit. The clearing stations prepare to care for an overload of patients pending the resumption of normal evacuation of supporting medical installations.

Section III. PRISONERS OF WAR

5-5. Prisoner of War Control

Division prisoner of war collecting points normally are established on the near bank of the river. These are established sufficiently far to the rear to prevent interference with combat operations and river line activities before and during operations. Division military police may establish forward brigade or task force temporary collecting points on the far bank immediately following the assault. This will relieve the combat forces of the responsibility for detaining captured personnel. Available empty transportation returning from the far bank is used to evacuate prisoners of war from the bridgehead or forward temporary collecting points.

5-6. Prisoner of War Interrogation

On the spot interrogation of prisoners of war and refugees by military intelligence interrogator and counterintelligence personnel can provide

information of immediate tactical value to the crossing unit. Normal evacuation and interrogation procedures are interrupted only while main division prisoner of war collecting points are crossing to the far side of the river. See FM 19-1 and FM 19-40.

Doctrinal Recapitulation

Combat service support must be continuous while the assault forces are separated from their support installations by the river.

The ability of the individual installations and activities to perform their assigned mission is paramount in locating the combat service support installations.

Critical supplies, when required by the assault forces, are delivered to the far bank of the river.

Combat battalion aid stations are established in the bridgehead to provide treatment and to reduce cross-river evacuation.

Control of division-level medical operations is initially decentralized to supported brigades, but reverts to the medical battalion as soon as communications and rear area protection permit.

Division prisoner of war collecting points are normally established on the near bank sufficiently far to the rear to prevent interference with combat operations.

Forward brigade or task force temporary collecting points may be established by division military police on the far bank immediately following the assault to relieve combat forces of the responsibility for detained or captured personnel.

CHAPTER 6

SPECIAL CONSIDERATIONS

(NATO STANAG 2017 and 2019, ABCA SOLOG 28 and 54, CENTO STANAG 2017 and 2019, SEATO SEASTAG 2017 and 2019)

6-1. Cold Weather Conditions

Ice often complicates river crossings. Assault boats, conning towers of fording tanks, and amphibious vehicles are vulnerable to floating ice and may be damaged if forced through ice layers. Normal floating bridges require protective measures to prevent damage to their floats.

Ice has a disastrous effect on floating bridges unless the flow of ice under the bridge is carefully controlled. Blocks of ice may be passed under and between the float supports if the blocks are broken into small chunks and pushed under the bridge. Explosives are used to break up ice jams. Construction of floating bridges should be avoided when ice is "running" on a river.

In extreme cold, some rivers may have sufficient ice covering to support vehicle movement. When the ice is weak or there is open water, it is often more economical and timesaving to clear the ice with explosives and to use standard floating bridges. Special precautions are necessary near the edge of ice and open water. Floating bridges should be removed before the spring breakup. FM 5-36 and FM 31-71 contain detailed information concerning reconnaissance for ice bridges and tables for carrying capacity of ice.

6-2. Retrograde Operations

Retrograde operations over an unfordable river are characterized by detailed planning and centralized control. The doctrine and techniques described in this manual apply to all three types of retrogrades. Paragraphs 4-11 through 4-24 apply equally to the retirement, both types of withdrawals, and both types of delays as long as sufficient time is available to accomplish the planning.

The doctrine and techniques on retrograde operations in FM 61-100 apply to such a situation. In addition, planning includes provisions for assigning engineers early in the operation to maintain existing bridges, rafts, and swim and ford sites; to construct new bridges; and to maintain or construct routes to and from the river.

Provisions must be made for defense of crossing areas against ground and air attacks.

Strong security forces supported by artillery are employed to hold and protect the crossing areas against—

- airborne/airmobile operations.
- guerrillas.
- infiltrators.
- air attacks

Friendly guerrilla forces can be utilized to assist in retrograde movements. They may—

- | | |
|---------------------------------|--|
| Secure critical terrain such as | <ul style="list-style-type: none"> • bridges. • defiles. • tunnels. |
| Conduct | <ul style="list-style-type: none"> • limited attacks. • ambushes. • harassing operations. |

Act as guides to crossing sites.

Guerrilla forces may also help military personnel who are separated from their units to return to friendly control. See also FM 21-76 and FM 31-21.

The destruction or removal of bridges is of major importance to the retrograde force. Plans and means should be provided to destroy or remove bridges once they are no longer needed. Orders should clearly define the authority for destruction or removal of bridges or rafts. The commander of the overall force conducting the retrograde operation may retain this authority or he may delegate it to a subordinate commander. No general rule applies to all situations.

In certain situations where all fixed bridges over a river have been destroyed—

- The main body crosses the major portion of its vehicles early in the operation so that floating bridges can be converted to rafts.
- The remainder of the main body crosses on rafts.
- The covering force normally uses amphibious or deep fording vehicles, assault boats, or aircraft to cross.
- If heavy items of equipment require the covering force to use rafts, the mobile floating assault ferry is used to the maximum.

In situations where fixed bridges span the river, a demolition firing party and a demolition guard are designated for each bridge to be destroyed.

- The guard commander has the authority to destroy the bridge, subject to conditions established by the retrograde force commander.
- The guard commander retains a list of all units that are to use the bridge.
- Each unit commander notifies the guard commander when his unit has cleared.

- After the main body has crossed, the majority of the bridges in the crossing zone are destroyed.
- Certain predesignated bridges are left for use by the covering force and are destroyed once the covering force has crossed.

The use of smoke (both night and day), scatterable mines, and STANO devices should be emphasized, where appropriate, during all retrogrades.

Army aviation units are employed to the maximum to evacuate personnel, supplies, equipment, and essential nonamphibious vehicles in the covering force and to assist in removal of bridges and rafts.

6-3. Stability Operations

Influencing considerations in stability operational environments are the lack of well-defined area of operations and the support of the population. A primary objective in mission accomplishment may be to control a neutral civilian population. Additional emphasis and considerations in this environment are given to the effects of river-crossing operations on the population, its control, and enemy forces. Enemy forces may be more concerned with influencing the civilian population and denying access of the population to the host country government than with establishing permanent control over terrain or immediately destroying friendly forces. Enemy tactics will be directed toward these primary objectives. Enemy control or harassment of crossing sites is often used to deny or reduce friendly access to critical contested areas. See FM 31-23 for additional discussion of stability operations.

River-crossing operations will be characterized by an increased use of small and independent unit operations.

- Planning, execution, and control will be generally at an echelon below the division and will be the responsibility of the force commander conducting the river crossing.
- The scope, planning considerations, available planning time, and the resources available may be reduced.
- Greater dependence and use may be required of civilian-controlled crossing means and resources.

The capabilities of insurgent forces to react to support a defense on the near bank or to attack the flanks or rear of the friendly forces require that combat support and combat service support units possess the capability for all-round defense. In the conduct of this defense—

- Considerations must be given to this insurgent capability in selecting a bridgehead or far bank objectives.
- Fire support should be planned and units should be located to permit firing in all directions.
- Each crossing echelon must include security forces. This then provides the followup and rear echelon units security against attack by insurgent forces.

Psychological operations plans provide themes and media to be employed against the enemy and to gain support of the civilian population.

- Psychological operations means should support deception operations.
- Intelligence necessary to support these operations may contribute to information on the enemy.
- The use of leaflets, posters, and loudspeaker broadcasts may inform, control, or direct civilians toward a desired reaction.

Planning and subsequent close coordination with friendly forces located near the river crossing can contribute to a successful operation, through their use—

- to support deception plans.
- to disseminate information to civilians.
- to provide reconnaissance of crossing sites, the river, or far bank.
- to provide intelligence.
- to attack enemy rear installations that will support mission accomplishment.

Gaining the support of the civilian population is an inherent goal of stability operations. The well-being and safety of civilians and their properties are considered in planning operations. The effects on the civilian population are considerations in the selection of crossing sites, use of smoke, chemical agents, and fires to support the operation.

Doctrinal Recapitulation

Ice often complicates stream crossings; the employment of assault boats, tanks, amphibious vehicles, and floating bridges requires special measures.

Detailed, centralized planning and control are normal in retrograde operations over a river obstacle.

Reliance on contingency plans and unit SOP's is characteristic of delay operations when ample planning time is not available.

An increased use of small and independent unit operations is characteristic of stability operations. An echelon below division generally plans, executes, and controls the river crossing in stability operations.

APPENDIX A

REFERENCES

A-1. Army Regulations (AR)

- | | |
|------------|---|
| (C) 10-122 | United States Army Security Agency (U). |
| 310-25 | Dictionary of United States Army Terms (Short Title: AD). |
| 310-50 | Authorized Abbreviations and Brevity Codes. |

A-2. Field Manuals (FM)

- | | |
|--------|--|
| 1-15 | Aviation, Battalion, Group, and Brigade. |
| 1-60 | Army Air Traffic Operations. |
| 1-100 | Army Aviation Utilization. |
| 3-10 | Employment of Chemical and Biological Agents. |
| 3-50 | Chemical Smoke Generator Units and Smoke Operations. |
| 5-1 | Engineer Troop Organizations and Operations. |
| 5-20 | Camouflage. |
| 5-34 | Engineer Field Data. |
| 5-35 | Engineers' Reference and Logistical Data. |
| 5-36 | Route Reconnaissance and Classification. |
| 5-135 | Engineer Battalion, Armored, Infantry, and Infantry (Mechanized) Divisions. |
| 5-142 | Nondivisional Engineer Combat Units. |
| 5-144 | Engineer Amphibious Units. |
| 6-20-1 | Field Artillery Tactics. |
| 6-20-2 | Field Artillery Techniques. |
| 7-10 | The Rifle Company, Platoons, and Squads. |
| 7-20 | The Infantry Battalions. |
| 7-30 | The Infantry Brigades. |
| 8-10 | Medical Support, Theater of Operations. |
| 8-15 | Medical Service in Divisions, Separate Brigades, and the Armored Cavalry Regiment. |
| 8-35 | Transportation of the Sick and Wounded. |
| 10-8 | Airdrop of Supplies and Equipment in the Theater of Operations. |
| 11-50 | Signal Battalion, Armored, Infantry, and Infantry (Mechanized) and Airmobile Division. |
| 11-57 | Signal Battalion, Airborne Division. |
| 17-1 | Armor Operations. |
| 17-30 | The Armored Brigade. |
| 17-36 | Divisional Armored and Air Cavalry Units. |
| 17-37 | Air Cavalry Squadrons. |

19-1	Military Police Support, Army Divisions and Separate Brigades.
19-4	Military Police Support, Theater of Operations.
19-25	Military Police Traffic Control.
19-40	Enemy Prisoners of War and Civilian Internees.
20-32	Landmine Warfare.
20-32A	Landmine Warfare (Scatterable Mines).
20-60	Battlefield Illumination.
21-40	Chemical, Biological, Radiological, and Nuclear Defense.
21-76	Survival, Evasion, and Escape.
24-1	Tactical Communications Doctrine.
27-10	The Law of Land Warfare.
30-5	Combat Intelligence.
30-10	Terrain Intelligence.
31-10	Denial Operations and Barriers.
31-11	Doctrine for Amphibious Operations.
31-12	Army Forces in Amphibious Operations (The Army Landing Force).
31-16	Counter guerrilla Operations.
31-21	Special Forces Operations—U.S. Army Doctrine.
(S) 31-21A	Special Forces Operations—U.S. Army Doctrine (U).
31-22	U.S. Army Counterinsurgency Forces.
(S) 31-22A	U.S. Army Counterinsurgency Forces (U).
31-23	Stability Operations, U.S. Army Doctrine.
31-35	Jungle Operations.
(C) 31-40	Tactical Cover and Deception (U).
31-71	Northern Operations.
(C) 32-5	Signal Security (SIGSEC) (U).
(S) 32-10	USASA in Support of Tactical Operations (U).
(C) 32-20	Electronic Warfare (Ground Based) (U).
33-5	Psychological Operations—Techniques and Procedures.
41-10	Civil Affairs Operation.
44-1	U.S. Army Air Defense Artillery Employment.
44-1-1	U.S. Army Air Defense Artillery Operations.
44-3	Air Defense Artillery Employment, Chaparral/Vulcan.
54-2	The Division Support Command and Separate Brigade Support Battalion.
55-10	Army Transportation Movements Management.
55-30	Army Motor Transport Operations.
57-1/AFM	
2-51	U.S. Army/U.S. Air Force Doctrine for Airborne Operations.
57-35	Airmobile Operations.
57-38	Pathfinder Operations.
61-24	Division Communications.
61-100	The Division.

100-10	Combat Service Support.
101-5	Staff Officers Field Manual: Staff Organization and Procedure.
101-10-1	Staff Officers Field Manual: Organizational, Technical, and Logistical Data—Unclassified Data.

A-3. Technical Manuals (TM)

5-210	Military Floating Bridge Equipment.
9-500	Data Sheets for Ordnance Type Materiel.
55-450-15	Air Movement of Troops and Equipment (Non-tactical).

A-4. DA Pamphlets

310-1	Index of Administrative Publications (Regulations, Circulars, Pamphlets, Posters, Joint Chiefs of Staff Publications, and General Orders).
310-3	Index of Doctrinal, Training, and Organizational Publications.
310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.



1



2



APPENDIX B
CROSSING EQUIPMENT
(NATO STANAG 2021, ABCA SOLOG 45R, and SEATO
SEASTAG 2021)

B-1. General

This appendix provides supplemental information on the types and capabilities of crossing means used during river-crossing operations.

B-2. Amphibious Vehicles

Types. Amphibious vehicles are divided into three general categories: carriers, landing vehicles (LVT), and lighters (LARC).

Carriers include armored reconnaissance airborne assault vehicles; tracked vehicles developed to transport personnel, cargo, mortars (self-propelled); and vehicles used for command and reconnaissance. The mobile floating assault bridge/ferry (MAB) and the self-propelled artillery vehicles with flotation devices installed are included. These vehicles are normally available to the division and corps.

Landing vehicles (LVT series) are designed as personnel carriers and combat support vehicles for use during coastal amphibious operations. Limited availability generally restricts their use to the crossing of wide rivers.

Lighters (LARC series) are vehicles developed for transporting supplies and equipment from ships to on-shore dumps during amphibious operations. Lighters may be used on large rivers for supply buildup on the far bank.

Operational Considerations. Amphibious vehicles enhance the speed and mobility of assault elements. They may be preloaded on the near bank and may be used to supplement rafts prior to bridge construction. Engineer effort may be required to prepare and maintain entry and exit slopes for large numbers of tracked vehicles. Lateral drift affects swimming vehicles. For stream velocities of 0.85 meter per second or less, drift may be negligible. Drift will occur for velocities over 0.85 meter per second. When the stream velocity and speed of the swimming vehicles are the same, drift will be 1 meter downstream for each meter of forward movement.

Technical Characteristics. See FM 5-144, FM 17-1, FM 31-12, TM 9-500, and other appropriate technical manuals.

B-3. Reconnaissance and Assault Boats

Three-man reconnaissance boat.

Use	Primarily to transport surface and underwater reconnaissance personnel.
Capacity	Three combat-equipped men.
Allocation	Three are allocated to each company in divisional, corps, and army combat engineer battalions.
Weight	Thirty-three pounds in backpack (includes paddles, pump, and repair kit).
Time to inflate	Five minutes.
Propulsion	Two paddles provided.
Operation	In stream velocities up to 1.5 meters per second.

Fifteen-man pneumatic assault boat (fig B-1).

Use	Primarily to transport an infantry squad across a water obstacle.
Capacity	Twelve combat-equipped men and an engineer crew (or 3,300 pounds of cargo).
Allocation	Eighteen boats in a divisional engineer battalion. Seventy boats in a corps or army float bridge company. Twenty boats can be carried in a 2½-ton truck.
Weight	Two hundred and sixty pounds (in nylon carrying case including paddles, pump, and repair kit).
Time to inflate	Five to 10 minutes.
Propulsion	Ten paddles are provided with the boat. Engineer crew of three controls the paddlers. When powered by a 25-hp outboard motor, an engineer crew of two is required.



Figure B-1. 15-man pneumatic assault boat.

Operation Can be paddled in currents up to 1.5 meters per second. When propelled by an outboard motor, can operate in currents up to 3.5 meters per second.

Use in medical evacuation. For use of assault boats to evacuate patients, see FM 8-35.

B-4. Aluminum Footbridge (fig B-2)

Use Primarily to rapidly cross combat-equipped troops across a water obstacle.

Capacity Daylight—75 men per minute. Night—40 men per minute (at 2-pace intervals).

Allocation One set (144 meters of foot bridge) is allocated to a corps or army float bridge company. One set is carried on two 2½-ton trucks and two 2½-ton utility trucks.

Operation In stream velocities of a maximum of 3.5 meters per second.

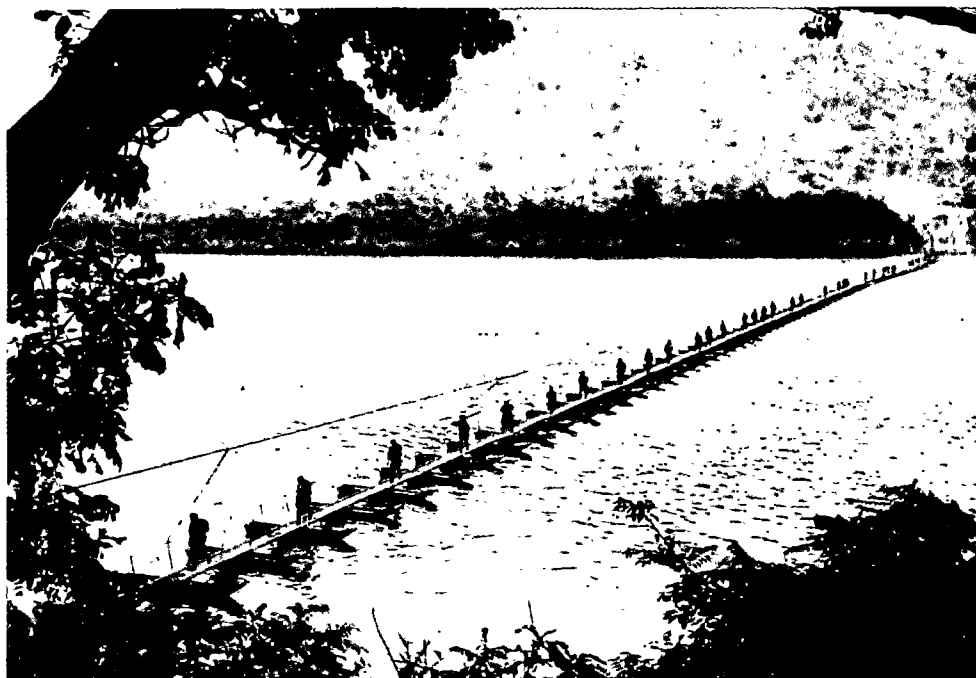


Figure B-2. Aluminum footbridge.

The aluminum footbridge is designed primarily for rapid river crossing of foot troops. A light-vehicle raft (fig B-3) capable of transporting ¼-ton vehicles or other vehicles of similar weight may also be constructed using components of the footbridge.

Table B-1. Assault Boats

1		2	3	4	5		
River crossing means		Crew engrs	Maximum loads (in addition to crew)	Maximum stream velocity (m per sec)	Time in min for round trip across stream w width		
					90 m	150 m	300 m
1.	Plastic assault boat						
	a. Paddled	3 men	12 riflemen with individual equipment	1.2	4	6	10
	b. Outboard motor propelled	2 men	12 riflemen with individual equipment	1.5	3	4	5
		2 men	7 riflemen with individual equipment	2.5	3	4	5
	c. Employed as storm boat	1 man	5 riflemen with individual equipment	3.2	3	4	5
2.	Pneumatic assault boat						
	a. Paddled	3 men	12 riflemen with individual equipment	1.5	4	6	10
	b. Outboard motor propelled	2 men	12 riflemen with individual equipment	3.5	--	4	5

B-5. Rafts and Ferries

Various size rafts and ferries capable of carrying light tactical vehicles or the heaviest division loads can be constructed from standard river-crossing equipment.

When required, preparation or construction of roads and approaches is normally more time-consuming than raft construction. Site preparation time, rather than raft or ferry construction time, normally is the deciding factor in arriving at operational times for rafts or ferries.

For types, characteristics, and additional data, see table B-2.

Caution. Commanders and staff planners must exercise caution in using the times listed in table B-2, column 5, to determine operational times for rafts (see table B-2, footnote b).

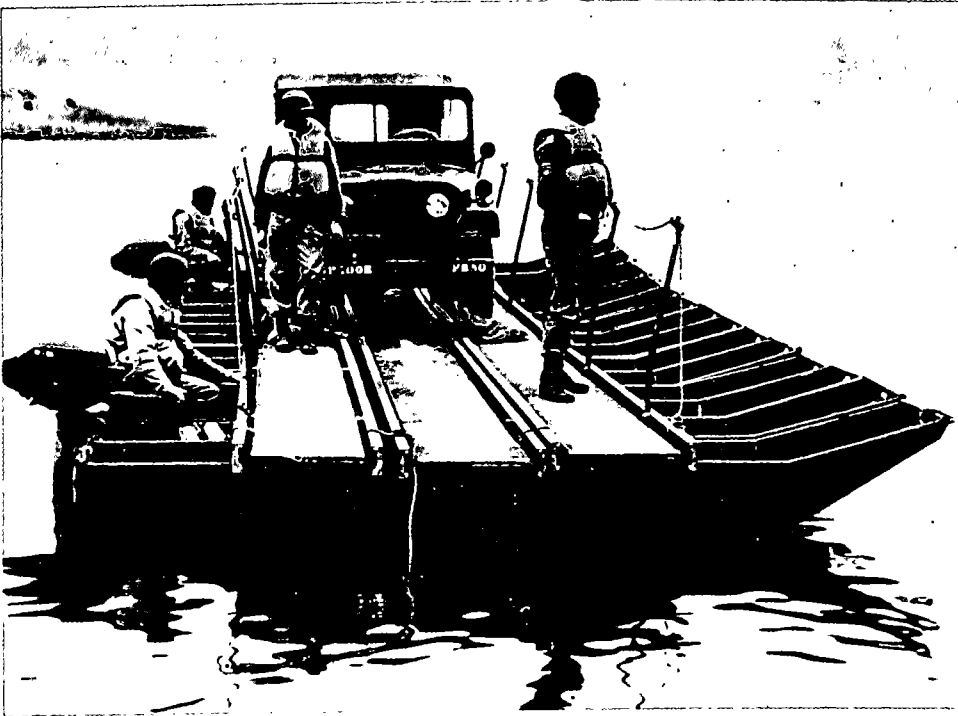


Figure B-3. Aluminum footbridge raft.

Light tactical raft (LTR). See figure B-4 and paragraph B-6.

M4T6 raft. See figure B-5.

Class 60 raft. See figure B-6.

Mobile assault bridge ferry (MAB). See figure B-7 and paragraph B-6.

B-6. Floating Bridges

General. When roads, approaches, and extensive anchorage systems are required, their preparation or construction is normally more time-consuming than bridge construction. Site preparation time, rather than bridge construction time, normally is the deciding factor in arriving at operational times for bridges.

For types, characteristics, and additional data, see table B-3.

Caution. Commanders and staff planners must exercise caution in using the times listed in table B-3 to determine operational times for bridges (see table B-3, footnote c).

Light tactical bridge (fig B-8). Light tactical bridging equipment can be used to assemble either rafts or floating bridges. The bridge can carry up to class 16 loads in currents not exceeding 1.5 meters per second. One set of this equipment provides 13 meters of normal bridging. Sets for constructing light tactical bridges/rafts are located in all float bridge companies except MAB-equipped units in corps or army.

Table B-2. Rafts and Ferries

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	Type of raft or ferry	No of pontoons or floats	Length (m)		Const time (min) ^b	Const party	Operating crew	Class and number of power units needed ^c								Type of power unit required	Transportation required. (For raft equip only. Additional needed for const equip and trps.)		
			Overall including ramps	Available for loading ^a				Normal crossing				Risk crossing							
								Stream velocity (m per sec)											
								0.9	1.5	2.1	2.7	0.9	1.5	2.1	2.7		No of units	Unit	
2	Light tactical raft without articulators	4 (4 bay)	14.3	12.2	30	1 plt	1 sqd and out-board motor operators	1616 11	1616 11	1616 22	88 33	2020 11	2020 11	2020 22	1616 33	25-hp out-board motor ^d	2	2½-ton cargo truck with 2½-ton pole trailer	
		5 (5 bay)	21.1	15.2	35			1616 11	1616 11	1414 22	88 33	1919 11	1919 11	1717 22	1212 33		2		
		6 (5 bay)	21.1	15.2	40			1818 11	1818 11	1818 22	1818 4^e	2222 11	2222 11	2222 22	2222 4^e		2		
	Light tactical raft with articulators	4 (3 bay)	18.0	10.0	30			1212 11	1212 11	1212 22	88 33	1414 11	1414 11	1414 22	1212 33		2		
		4 (4 bay)	21.4	12.2	35			1010 11	1010 11	1010 22	66 33	1212 11	1212 11	1212 22	1010 33		2		
		5 (5 bay)	24.8	15.2	40			99 11	99 11	99 22	88 33	1111 11	1111 11	1111 22	1111 33		2		
		6 (4 bay)	21.4	12.8	45			1313 11	1313 11	1313 22	1313 4^e	1515 11	1515 11	1515 22	1515 4^e		2		

See footnotes at end of table.

B-1152

Table B-2.—Continued

	1	2	3 4		5	6	7	8	9	10	11	12	13	14	15	16	17	18							
1	Type of raft or ferry	No of pontoons or floats	Length (m)		Const time (min) ^b	Const party	Operating crew	Class and number of power units needed ^c								Type of power unit required	Transportation required. (For raft equip only. Additional needed for const equip and trps)								
			Overall including ramps	Available for loading ^a				Normal crossing				Risk crossing													
								Stream velocity (m per sec)																	
								0.9	1.5	2.1	2.7	0.9	1.5	2.1	2.7										
3	Class 60	4 Norm	28.2	15.5	70 ^f 30 ^g	1 pl ^f g	1 sqd and power unit operators	45 1	40 1	45 1	40 1	45 3	40 2	35 1	50 1	55 1	50 2	50 3	45 3	27-ft bridge erection boat ^h	5	5-ton bridge truck			
		5 Reinf	28.2	15.5	80 ^f 35 ^g			60 1	55 1	60 1	55 2	50 4	50 1	70 1	60 1	70 1	60 2	65 2	60 4		60 5		55 3	6	
		6 Reinf	28.2	16.5	90 ^f 50 ^g			75 1	65 1	75 1	65 2	75 2	65 4	60 1	90 1	80 1	90 1	80 2	90 2		80 4		80 4	70 2	6
4	M4 ¹ (standard B)	4	26.5	15.7	70 ^f	1 pl ^t	1 sqd and power unit operators	55 1	50 1	55 1	50 1	55 1	50 1	60 1	55 1	60 1	55 1	60 1	55 1	55 1	27-ft bridge erection boat ^h	5	2½-ton bolster truck with 2½-ton bolster trailer		
		6 Reinf	26.5	15.7	80 ^f			75 1	70 1	75 1	70 1	70 2	65 1	80 1	75 1	80 1	75 1	80 1	75 2	80 2		75 2		75 1	6
		7 Reinf	26.5	15.7	85 ^f			90 1	85 1	90 1	85 1	85 1	80 3	95 1	90 1	95 1	90 1	95 1	90 1	95 1		90 3		90 3	90 3
5	M4T6 ⁱ	4	26.5	15.7	90	1 pl ^t	1 sqd and power unit operators	55 1	50 1	55 1	50 2	45 2	40 3	35 1	65 1	60 1	65 1	60 2	55 2	50 3	45 3	27-ft bridge erection boat ^h	5	5-ton bridge truck	
		5 Reinf	27.1	15.3	100			65 1	60 1	65 1	60 2	65 2	60 3	55 3	75 1	70 1	75 1	70 2	75 2	70 3	65 3		6		
6	Mobile floating assault bridge-ferry (MA8) (U.S.)	0/2 ^k	22.5	8.5	6	None ^j	Amphibious vehicle crews	36/36 36	36/36 36	36/36 36						Self-contained power	2	Self-contained							
		1/2 ^k	30.5	16.5	8			47/47 54	47/47 54	47/47 54							3								
		2/2 ^k	38.4	24.4	10			60/62 72	60/62 72	60/62 72							4								
		3/2 ^k	46.3	32.3	12			60/62 90	60/62 90	60/62 90							5								
		4/2 ^k	54.2	40.2	12			60/62 108	60/62 108	60/62 108							6								
7	Amphibious river-crossing equipment (ARCE) (French)	2/- ^k	32.0	17.2	15	None ^j	1 man and amphibious vehicle crews	45/50 55	45/50 50	40/45 45						Self-contained power	4	Amphibious bridge vehicles plus two amphibious ramp carriers or one 5-ton tractor with 25-ton low-bed trailer							
		3/- ^k	40.0	25.2	20			60/65 88	60/65 80	55/60 71							5								
		4/- ^k	48.0	33.2	25			60/65 108	60/65 99	55/60 89							6								
		5/- ^k	56.0	41.2	31			60/65 135	60/65 121	55/60 108							7								

See footnotes at end of table

See footnotes at end of table.

Table B-2.—Continued

1		2	3	4
1	Operating characteristics of rafts and ferries	Stream width (m)		
		75	150	300
2	No of round trips per hr in currents of 1.6 m per sec in daylight (reduce 50 percent for night or adverse conditions):	Trips per hr		
	Light tactical raft	8	6	4
	Class-60 raft	6	4	2
	M4T6 raft	8	6	4
	ARCE/MAB	8	6	4
6	No of rafts that can be used efficiently at one time	1	2	3

^aMeasured from outside edge to outside edge of end pontons or float saddle beams, except mobile assault ferry, which is measured from ramp joint to ramp joint.

^bIncludes unloading and assembly times only; does not include time for preparation of landing sites or construction of access roads. Times are based on use of trained personnel and no delays.

^cCapacities are based on loading rafts with center of gravity of loads 15.24 centimeters (6 inches) downstream of raft centerline and on properly inflated floats, or conversion from highway travel condition to water entry configuration for ARCE ferry.

^d27-ft erection boat may be used when pusher connector is lashed to pontons.

^eMust be launched upstream of far-shore exit, since power units will not counteract velocity of stream when the raft is loaded.

^fTruck-crane or equivalent required for assembly time.

^gComplete bays preassembled in rear area and launched directly from transporting trailer into water at assembly site.

^hOne 19-ft bridge erection boat may be used in current not more than 1.6 m per sec. In 1.6-m-per-sec or more current, two 19-ft boats may be substituted for one 27-ft boat.

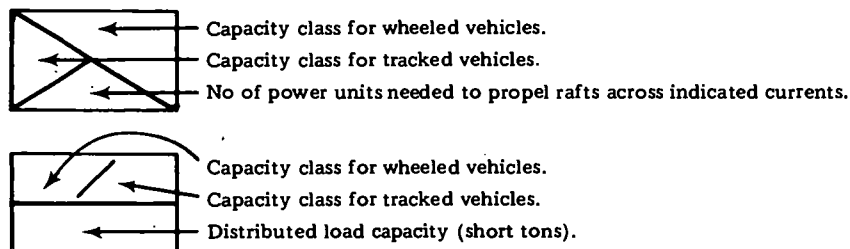
ⁱRoadway width consists of 18 balk between curbs in 22-balk deck.

^jExtreme caution is required in loading and unloading vehicles weighing more than 60 tons.

^kNo of interior bays/no of ramp bays.

^lExclusive of amphibious vehicle crews.

LEGEND



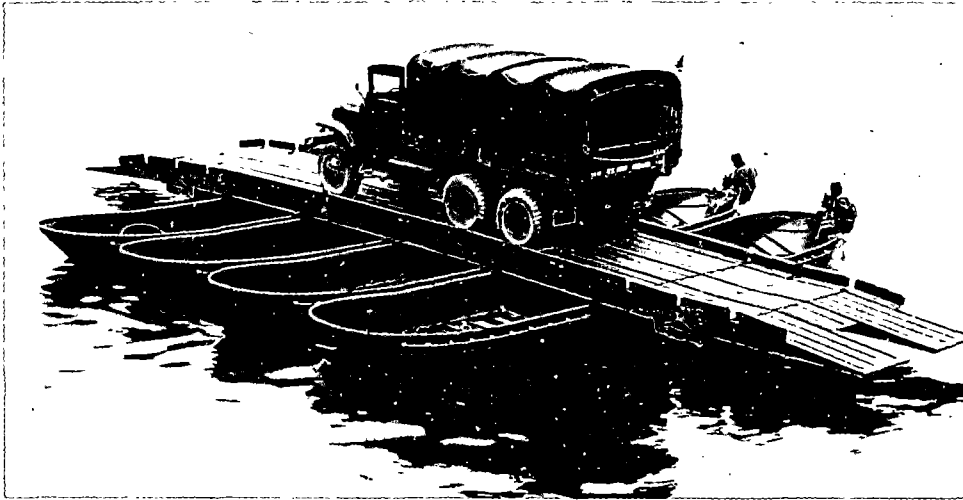


Figure B-4. Light tactical raft.

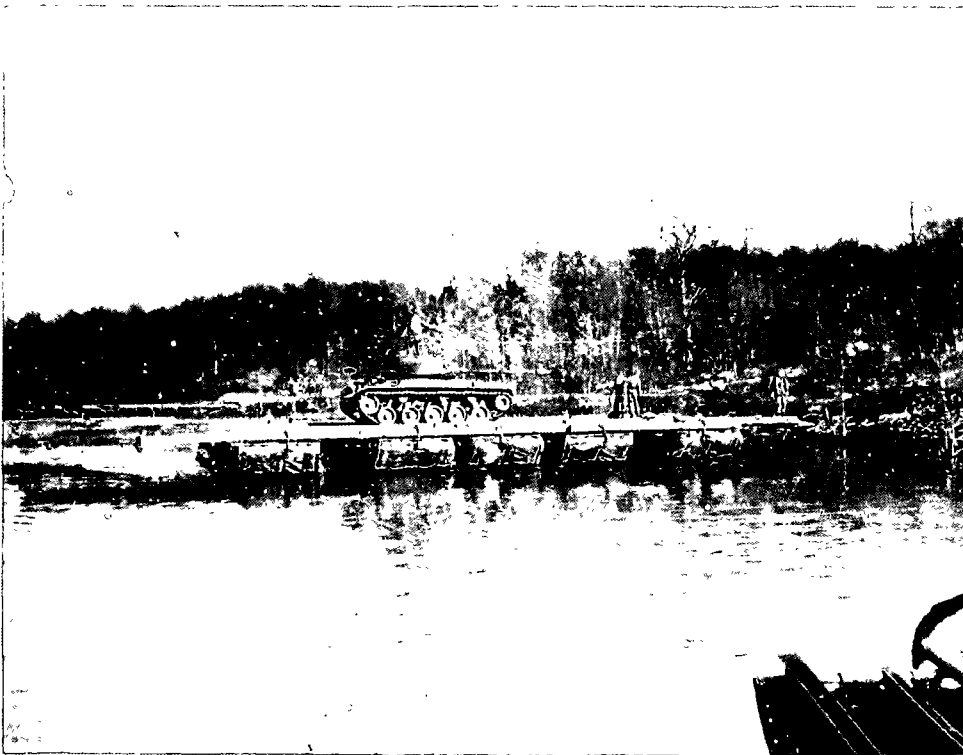


Figure B-5. M4T6 raft.

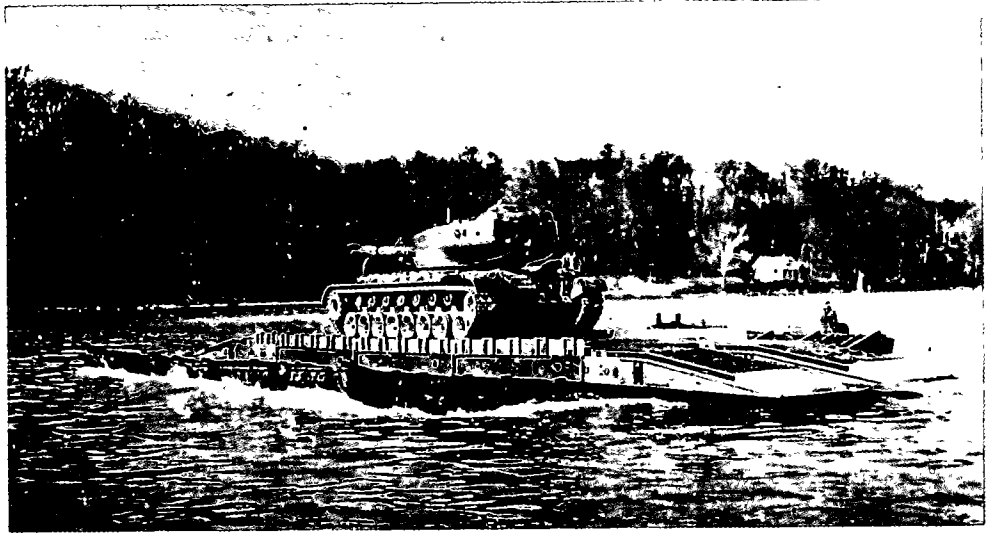


Figure B-6. Class 60 raft.

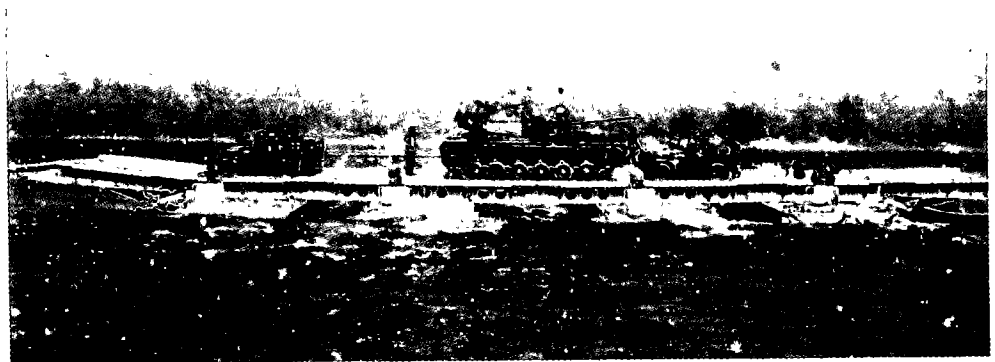


Figure B-7. Mobile assault bridge ferry (MAB) (typical load).

M4T6 bridge (fig B-9). This standard floating bridge is organic to all float bridge companies except those equipped with the MAB. The M4T6 can be erected by hand and consists of a continuous roadway of aluminum-alloy deck balk supported by 24-ton pneumatic floats. This bridge provides a means for crossing divisional, corps, and army loads.

Class 60 bridge (fig B-10). The class 60 bridge may be issued in lieu of M4T6 bridging equipment. This bridge must be erected using a crane. It is supported on the same 24-ton pneumatic floats as the M4T6 bridge. The class 60 bridge also provides a means for crossing divisional, corps, and army loads.

Table B-3. Floating Bridges

1		2		3		4		5		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	Type of bridge	Transportation required ^a	Construction party ^b		Construction time ^c (hr)		Maintenance crew	Load class ^d																		Traffic capacity and vehicle distance for safe crossing in daylight (except as otherwise noted) ^h			
			Stream width (m)		Safe crossing (posted capacity) ^e			Caution crossing ^f			Risk crossing ^g																		
					Stream velocity (m per sec)																								
		Up to 60		60-160		160-325		0.9 1.5 2.1 2.4 2.7 3.4 0.9 1.5 2.1 2.4 2.7 3.4 0.9 1.5 2.1 2.4 2.7 3.4																					
2	Footbridge, aluminum	1 2½-ton truck and 1 2½-ton pole trailer per 77.4 meters of bridge	1 plt ½-½	1 plt ½-½	...		1 sqd	Safe																		Daylight: 75 men per min Night: 40 men per min at 2-pace distance ⁱ			
3	Light tactical bridge	2 2½-ton trucks and 1 2½-ton pole trailer per 14.4 meters of bridge	1 plt 1-1½	2 plt 1½-2½	...		1 sqd	16	16	13	11	8	2	18	18	15	12	9	3	21	21	17	14	11	5	400 vehicles per hr, 30-meter distance between vehicles ^j			
4	M4T6 floating bridge ^k	Normal	1 5-ton truck per 4.9 meters of bridge	1 co	2 co	2 co to 1 bn	1 sqd	50	45	55	40	35	30	25	60	58	54	49	45	35	68	66	63	59	54	43	400 vehicles per hr, 30-meter distance between vehicles ^j		
		Reinforced	1 5-ton truck per 3.3 meters of bridge	2-3	3-5	5-10		75	75	70	65	60	55	80	80	79	73	66	63	90	90	87	81	59	60				
5	Class 60 floating bridge	Normal	1 5-ton bridge truck per 4.9 meters of bridge	1 co	2 co	2 co to 1 bn	1 sqd to 1 plt ^m	60	55	45	40	35	22	65	62	56	52	45	34	75	72	67	62	57	46	400 vehicles per hr, 30-meter distance between vehicles ^j			
		Reinforced	1 5-ton bridge truck per 4.9 meters of bridge	2-3	3-5	5-10		65	65	55	50	45	25	70	67	61	56	49	37	79	77	72	67	62	50				
6	M4 floating bridge (standard B)	Normal ^o	1 2½-ton bolster truck and 1 2½-ton bolster trailer per 4.9 meters of bridge	1 co	2 co	2 co to 1 bn	1 sqd to 1 plt ^m	60	60	50	45	35	20	65	65	55	52	45	30	70	70	60	58	50	40	400 vehicles per hr, 30-meter distance between vehicles ^j			
		Reinforced ^o	1 2½-ton bolster truck and 1 2½-ton bolster trailer per 3.3 meters of bridge	2-3	3-5	5-10		100	100	100	60	55	40	105	105	105	75	74	85	110	110	110	88	85	70				
7	Mobile floating assault bridge-ferry (MAB) (U.S.)	No of interior units = bridge length (m) - 20 792 (plus 2 ramp units)	(P)	(P)	(P)	(P)	(P)	62	62	55	55	(Ratings are tentative)														400 vehicles per hr, 30-meter distance between vehicles ^j			
8	Amphibious river-crossing equipment (ARCE) (French)	1 amphib brg veh per 8.0 meters of brg exclusive of 8.0 meters' ramp at each end of brg and 2 amphib ramp carriers or 1 5-ton trac w 25-ton low-bed tr	(P)	(P)	(P)	(P)	(P)	60	60	55	55	(Ratings are tentative)														400 vehicles per hr, 30-meter distance between vehicles ^j			
			1	1½-2	1 ¾-3																								

^aTransportation for bridge equipment only. Additional needed for any construction equipment required end for troops.
^bAverage for trained troops and continuous daylight assembly. Allowances are required for specific situations and the longer spans.
^cIncludes unloading and assembly times in daylight only. Does not include time for construction of access roads, assembly site, embankments, or anchorages. Does not include time for conversion from highway travel conditions to water entry configuration for the ARCE units. Time is based on use of trained troops and no delays. Average time with 2 assembly sites.
^dBased on ebullient at levels within 30.48 centimeters (12 inches) of floating bridge deck level.
^eVehicle anywhere on bridge deck between curbs. Speeds up to 40 kmph permitted, but 24 kmph recommended. Vehicle spacing is 30 meters.
^fCenter of vehicle within 30.48 centimeters (12 inches) of bridge centerline. Maximum speed is 15 kmph. Vehicle spacing is 50 meters. No stopping, accelerating, or gear shifting.
^gCenter of vehicle within 72.86 centimeters (9 inches) of bridge centerline with guide. Maximum speed is 5 kmph. One vehicle on bridge. No stopping, accelerating, or gear shifting.
^hTraffic capacities are for all traffic forward or rearward.
ⁱReduce capacity 20 percent for currents of from 3 to 3.6 m per sec.
^jBased on favorable approach and ramp-angle conditions.

^kRatings based on 18 half-curbs (166½ in) in 22-half-wide superstructure.
^l60-ton tanks having tread widths of 143 inches or more may cross safely up to 2.3 m per sec.
^mDepending on length of bridge and general conditions.
ⁿRatings based on use of reinforcing position in end span and 18 half between curbs (166½ in) in 22-half-wide superstructure.
^oRatings based on use of double deck and span, 100 percent reinforced floating section, and 20 half between curbs (185 in) in 24-half-wide superstructure.
^pOnly MAB/ARCE crews are required, plus bank and access road preparation, as needed.

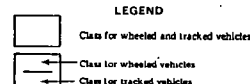




Figure B-8. Light tactical bridge.

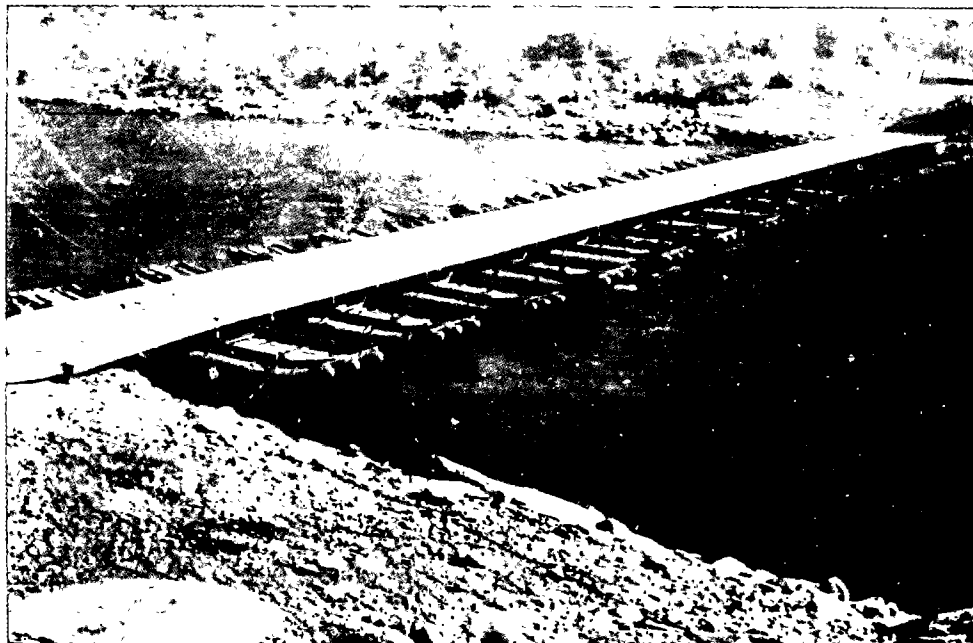


Figure B-9. M4T6 bridge.

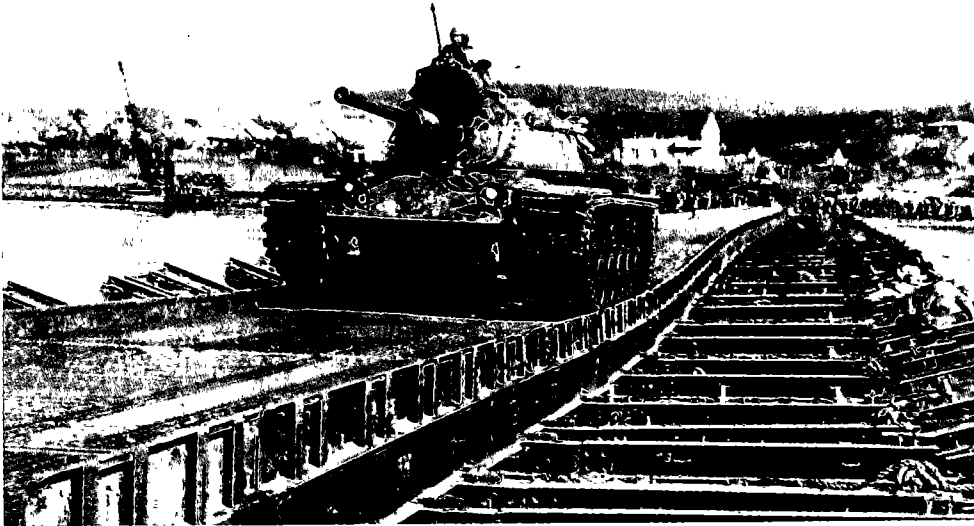


Figure B-10. Class 60 floating bridge.

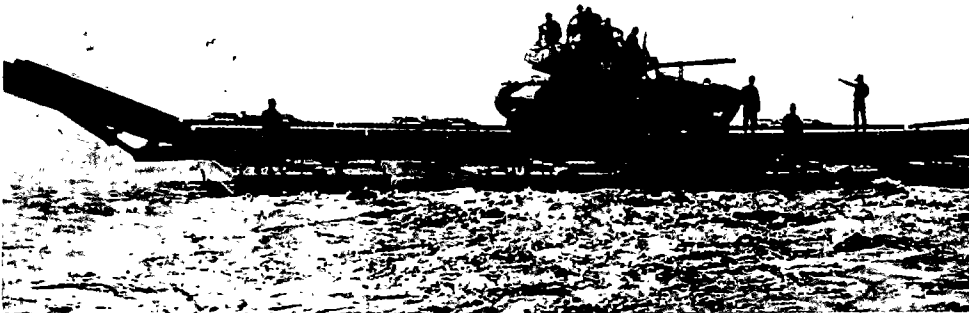


Figure B-11. Mobile assault bridge ferry (MAB).

Mobile assault bridge ferry (MAB) (fig B-11). The mobile assault bridge ferry (US) (MAB) is designed for rapid assembly as either a ferry or a floating bridge. The bridge company of the armored, infantry, and infantry (mechanized) divisions and the engineer assault bridge company, mobile (TOE 5-64), are equipped with this type of bridging. Each bridge vehicle enters the water from march column, without earlier preparation, and can be joined together to form a 149-meter bridge or four six-unit rafts.

B-7. Armored Vehicle Launched Bridge

The armored vehicle launched bridge (AVLB) (fig B-12) is an 18.3-meter

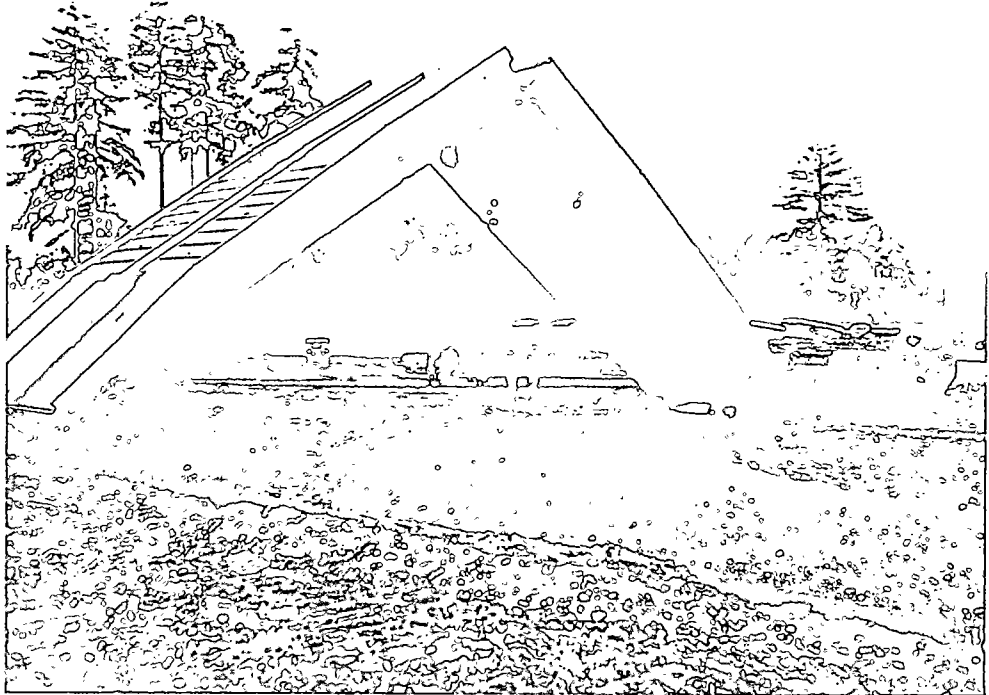


Figure B-12. Armored vehicle launched bridge.

Table B-4. Short Fixed Spans

a. Capacity of M4 decking for short fixed spans.

Type of crossing	Capacity for specified span length (meters) and ratio of deck/roadway widths															
	7.1		9.1				11.7				13.7					
	22 18	22 18	22 16	24 18	22 18	22 16	24 18	26 18	20 16	22 18	22 16	24 18	24 16	26 18	26 16	
Normal	120 ^a 100	85 65	90 70	90 70	45 35	50 40	55 45	65 50	24 25	24 25	30 30	30 30	40 35	40 35	45 40	
Caution		100 80	100 80	105 85	70 51	70 51	75 55	82 60	40 35	46 40	46 40	51 43	51 43	56 46	56 46	
Risk		110 90	110 90	115 95	78 57	78 57	85 62	90 67	47 40	54 45	54 45	60 49	60 49	66 53	66 53	

^aLimited by roadway width.

Wheeled vehicle class/tracked vehicle class.

22 Total width of bridge in number of balk

18 Total width of roadway in number of balk

b. Capacity of class 60 decking for short fixed spans.

Types of crossings	Capacity for specified clear span (meters)											
	7.3	7.9	8.5	9.1	9.8	10.4	11.0	11.6	12.2	15.2	18.3	
Normal	120 ^a 100 ^a	120 ^a 95	115 80	105 65	95 60	85 55	75 50	65 45	60 40	30 30	20 22	
Caution	120 ^a 100 ^a	120 ^a 100	120 ^a 87	110 65	105 70	90 63	81 58	75 53	68 50	36 36	22 25	
Risk	120 ^a 100 ^a	120 ^a 100 ^a	120 ^a 100	120 ^a 90	120 85	110 75	100 68	90 65	83 60	50 45	28 30	

^aLimited by roadway width.

Wheeled vehicle class/tracked vehicle class.

span crossing device capable of handling all divisional loads. It is organic to the tank and division engineer battalions in infantry, mechanized, and armored divisions except the airborne and airmobile. The AVLB is employed primarily in assault crossings of short gaps; but, because of its mobility, low unit weight, and minimum crew requirements, it may be used effectively in other ways. The armored vehicle bridge launcher equipped with a 63-foot scissor-type bridge is particularly suitable for spanning streams, antitank ditches, craters, canals, partially blown bridges, and similar obstacles. The AVLB may be placed over existing bridges or parts of existing bridges to increase their load-carrying capacity.

B-8. Panel Bridge, Bailey Type, M2 (TM 5-277)

Types of Structure

General. Panel bridge equipment can be used to build fixed bridges and panel crib piers and towers. Other special structures, such as suspension bridge towers and retractable bridges and mobile bridges, can be constructed using special parts.

Normal construction. Panel bridge equipment normally is used to erect fixed simple-span, single-lane, through-type bridges from 9 to 64 meters long. The bridge can be assembled to meet varying conditions of span and load.

Special construction.

Bridges. Panel bridge equipment also can be used to build two-lane, through-type bridges, single lane, or two-lane deck-type bridges, railway bridges, and bridges on piers. It can also be used as the superstructure for floating bridges using Navy cubes, barges, or other expedient floats.

Piers. Panel crib piers and towers up to 21.3 meters high can be built with panel bridge equipment and special crib pier parts.

Expedients. Panel bridge equipment also can be used in whole or in part to build many structures, such as causeways, box anchors, towers for floating bridge cables, loading hoppers, and gantries.

Situations

General. The panel bridge is used to carry both division and army loads as a tactical bridge.

Tactical.

Initial assault. For the initial assault, the panel bridge generally is not used except in special situations.

Buildup. The fixed simple-span panel bridge is used most often for the buildup. However, when a long, simple-span bridge is needed, it is sometimes more economical in time and material to build a bridge on piers, especially if partially demolished piers already exist.

Line of communications. The panel bridge is an excellent line of communications bridge. It can be built as a through-type bridge and as a fixed deck-type bridge.

B-9. Short Gap Fixed Spans

The M4 decking on the M4 and the M4T6 bridge and class 60 decking can be used to span short gaps (table B-4).

B-10. Fording Vehicles

Tanks and tank support vehicles that may be used in river crossings include—

Shallow fording:

All light and medium tanks to depths of 4 feet without deep-water fording kits.

Vehicle, tank recovery, medium.

Certain wheeled, combat service support vehicles.

Deep-water fording:

Armored vehicles, with the deep-water fording kit mounted, can ford up to 13½ feet of water when suitable river conditions exist (TM 9-500).

B-11. Landing Craft

Types. The following landing craft may be used in a river crossing.

Landing craft, mechanized, MARK VIII (LCM 8).

Landing craft, utility (LCU).

Technical characteristics. See FM 31-12.

B-12. Army Aviation

For detailed capabilities and characteristics of Army aircraft, see TM 55-450-15 and FM 101-10-1.

APPENDIX C

THE PLANNING SEQUENCE

CROSSING FORCE OPERATIONAL PLANNING REQUIREMENTS

Corps normally is responsible for control of the detailed planning for and conduct of a river-crossing operation. On receipt of a directive from army, tentative plans previously prepared for a specific area are developed in detail.

Employment of the division or smaller unit in an independent river crossing normally requires augmentation with combat support and combat service support units.

Planning staffs of units conducting independent operations may have reduced planning time, and the detail may vary; however, all planning factors should be considered.

Planning is developed from the bridgehead line back toward the river line.

PLANNING SEQUENCE AND CONSIDERATIONS

ALERT	Early decision and notification of subordinate units.
BRIDGEHEAD SELECTION	Sufficient size and terrain to accommodate the crossing.
OBJECTIVE SELECTION	Primary interest/controlling terrain, observation, and defensibility.
TROOPS REQUIRED	Estimate strength and allocation of troops necessary to secure the bridgehead.
TIME	Determine time required for securing the selected bridgehead.
RESOURCES AVAILABLE	Consider use and allocation of— • Assault forces. • Airborne forces. • Airmobile forces. • Friendly guerrillas. • Engineers. • Fire support. • Air defense. • Chemicals. • Military police.

	• Communications. • Intelligence. • Electronic warfare (EW) resources.
INTERMEDIATE OBJECTIVES	Consider selection and seizure of intermediate objectives, if required.
MANEUVER PLAN	Determine the crossing force maneuver plan.
MISSIONS	Determine and assign missions to subordinate units (to include attached and supporting units).
CONTROL MEASURES	Determine control measures necessary for control of the crossing.
CROSSING MEANS AND SITES	Determine the most advantageous crossing means and sites to be utilized.
CROSSING FRONTS	Designate crossing fronts, areas, sites, and, as necessary, the location of bridge sites.
OPERATIONAL TIMES	Estimate times at which rafts, ferries, and bridges should be operational.
CROSSING EQUIPMENT AND ADDITIONAL TROOPS	Determine amounts and types of crossing equipment and additional troops required.
CROSSING PLAN	Determine the crossing sequence of units.
COMMUNICATION PLAN	Determine the communication requirement for the operation and any special communication required, including communications security considerations.
PHASES	Determine the number of phases required.
AIRSPACE COORDINATION	Determine control measures for centralized coordination of tactical air support, Army aviation, field artillery, and air defense artillery over the crossing area.
COMBAT AND COMBAT SERVICE SUPPORT	Determine the combat and combat service support required for each phase.
SPECIAL TRAINING AND PLANS	Determine special training required and prepare training plans.
VULNERABILITY TO ENEMY ATTACK	Evaluate the command's vulnerability to enemy attack, including nuclear, chemical-biological, and air, during each operational phase.
DECEPTION PLANS	Develop these plans, as required.
CIVIL-MILITARY OPERATIONS	Determine the civil-military operations requirements for each phase.

ADJUSTMENT OF
REQUIREMENTS

Reevaluate and adjust overall requirements.

DISSEMINATE
TENTATIVE PLANS

Disseminate to subordinate units tentative plans, intelligence, and the crossing force commander's concept and phasing.

APPROVAL OF SUB-
ORDINATE PLANS

Coordinate and approve subordinate unit plans.



2
2



2
2



APPENDIX D

DEVELOPING A CROSSING PLAN (NATO STANAG 2014, ABCA SOLOG 17R, CENTO STANAG 2014, and SEATO SEASTAG 2014)

D-1. General

This appendix describes one method by which a division crossing plan may be developed. The hypothetical 20th Infantry Division has been used in the examples; however, the same procedures are applicable to other types of divisions. The details and format should be varied, as required, to suit the situation.

D-2. Site Selection

In most river-crossing operations, the combat maneuver plans and technical considerations of site selection are in conflict. For example, from a technical viewpoint, the selection of an old permanent bridge location usually offers several advantages as a floating bridge site. The access roads are simple to construct, and the piers of the old bridge can be used to anchor the floating bridge. However, from a tactical viewpoint, old bridge sites are usually heavily mined and are excellent registration points for enemy artillery. The commander must recognize this conflict, weigh the factors, and make necessary compromises to arrive at a sound, workable solution.

Tables D-1 and D-2 show a sample format for evaluating the tactical and technical aspects of assault crossing sites and raft and bridge sites. Additions and deletions to the features listed should be made as conditions warrant. Similar tables may be established for evaluating fording sites or for comparing the advantages and disadvantages for the use of Army aviation, amphibious vehicles, and assault boats in a particular situation.

D-3. Organizing Alternate Crossing Capabilities for Comparison

In selecting the proper crossing alternative, the number of vehicles to be crossed must be weighed against the available crossing means. Table D-3 lists the vehicle raft requirements for organic and attached vehicles available at the time of the crossing. Table D-4 shows the available crossing means (assuming that one bridge company is attached from corps).

D-4. Comparison of Alternate Crossing Capabilities

Table D-5 is a comparison of the alternative crossing capabilities and is an estimate of the number of vehicles that can be crossed per hour after the attack is launched.

The following intelligence and planning factors were used in developing table D-5:

Velocity of river—1.6 meters per second
Width of river throughout crossing front—100 meters
Construction begins:
 Light tactical raft—H + 1
 M4T6 raft—H + 1 and 30 min
 Mobile assault bridge ferry—H + 1 and 30 min
 M4T6 bridge—H + 2 and 30 min

Construction times (tables B-2 and B-3); site and approach road preparation were minimal:

 Light tactical raft—30 min
 M4T6 raft—1 hr and 30 min
 Mobile assault bridge ferry—12 min
 M4T6 bridge—3 hr and 30 min

Round trips per hour (table B-2):

 Light tactical raft—7
 M4T6 raft—7
 Mobile assault bridge ferry—7

Light tactical raft (LTR) and M4T6 raft capabilities are based on one vehicle per trip (increase to two vehicles for M4T6 rafts transporting class 12 and smaller vehicles).

Mobile assault bridge ferry vehicles are computed on basis of two class 60 vehicles per trip. (Number of vehicles can be increased by two for ferries carrying vehicles under class 12.)

In table D-5, the figures for each hour are cumulative and do not include vehicles that cross, using their amphibious capability.

In analyzing the alternatives, the following were considered:

- Sufficient crossing volume provided to permit timely accomplishment of the mission.
- Organic and attached engineer effort required to construct and operate the crossing means.
- Provision for buildup of essential vehicles and equipment in the bridgehead between the time of the assault crossing and completion of floating bridges.
- Vulnerability of crossing means to enemy attack.
- Traffic control problems created by limited crossing means.
- Congestion created by limited crossing means thereby presenting a lucrative target to the enemy.

In selecting the crossing capability best suited for this particular situation, the relative merits of raft versus bridge operation were examined. Rafts are excellent means of moving essential vehicles into the bridgehead during the interval between the assault crossing and completion of the bridge.

Table D-1. Evaluation of Assault Crossing Sites

		Assault site		
		1	2	***
Access to crossing site (Road net [RN] and cross-country mobility [CCM])	Foot troops (with assault boats)	RN-fair CCM-poor (marshes)	RN-fair CCM-good	***
	APC	RN-fair CCM-poor (marshes)	RN-fair CCM-good	***
Egress from crossing site	Foot troops	RN-poor CCM-fair	RN-good CCM-good	***
	APC	RN-poor CCM-fair	RN-good CCM-good	***
Stream velocity	Assault boats	Fair	Good	***
	APC	Fair	Good	***
Obstacles affecting movement	Near shore	None	None ¹	***
	Water area	None	None ¹	***
	Far shore	None	None ¹	***
Bank (composition and slopes)	Foot troops in assault boats	Fair	Good	***
	APC	Poor-far shore requires con- siderable engineer work	Fair	***
Enemy situation-far shore		Poor-enemy positions along ridge	Poor-enemy positions vicinity Hill 206	***
Assembly areas available		Fair	Fair	***
Attack positions available	Day	Poor-too far from river	Poor-little concealment	***
	Night	Good	Good	***
Avenues of approach (to objective-far shore)		Fair-terrain good, but long	Good	***
Dominating terrain (near shore)		Poor	Fair	***
Space for movement		Poor-limited to north by division boundary	Good	***
Remarks and/or recommendations		Reject. Site presents difficult problems, both tactical and technical	Select. Advis- able to employ night assault or smoke attack positions	***

¹Except vicinity of old bridge site.

Table D-2. Evaluation of Float Bridge and Raft Sites

Feature		Site			
		***	G	H	***
Roads (vicinity near shore)	Class	***	60	60	***
	Road net	***	Good	Fair	***
Roads (vicinity far shore)	Class	***	60	60	***
	Road net	***	Good	Fair (1-way)	***
Road construction requirements	Near shore	***	Repair craters	Requires 400-m access road	***
	Far shore	***	Remove mines	Remove mines, clear rubble	***
Crossing class (on stream velocity for wheel/track)	LTR (4-ponton)	***	12/12	12/12	***
	Mobile floating aslt raft (4-float)	***	60/65 or 2 ea 60	60/65 or 2 ea 60	***
	M4T6 raft (4-float)	***	50/55	50/55	***
	M4T6 bridge	***	45/55	45/55	***
Obstructions (water area)		***	None	None	
Width of river (meters)		***	98	100	***
Banks	Preparation required	***	Good	Poor—will require some gravel and revetting	***
	Support loads	***	Good	Fair	***
Equipment erection area	River	***	Fair	Fair	***
	Rear	***	Good	Good	***
Anchorage	Holdfasts	***	Good	Fair	***
	Bottom	***	Poor	Poor	***
Remarks and/or recommendations		***	Select. Good raft or bridge site	Reject. Poor raft and bridge site. Would require considerable effort and tie-in to only fair road net	***

Table D-3. Vehicle Raft Requirements

Unit	Amphibious vehicles	Light tactical raft (vehicles cl 12 or less)	M4T6 or mobile aslt (vehicles cl 12 and over)
1st Bde/20th Inf Div:			
Bde HQ -----	2	48	1
1-66 Inf -----	0	117	1
*** -----	***	***	***
63d Arty Gp HQ -----	0	30	0
1-45 FA -----	0	121	1
1-651 FA -----	0	97	32
*** -----	***	***	***
*** -----			
B/23d Maint -----	0	41	3
*** -----	***	***	***
Total 1st Bde -----	37	933	172
2d Bde/20th Inf Div:			
Bde HQ -----	2	48	1
*** -----	***	***	***
A/1-76 Mech -----	18	5	18
*** -----	***	***	***
Total 2d Bde -----	64	636	45
3d Bde/20th Inf Div:			
*** -----			
Total 3d Bde -----	27	438	89
20th Inf Div Arty:			
HHB -----	0	67	0
1-47 FA -----	0	121	1
*** -----	***	***	***
Total Div Arty -----	0	601	153
20th Inf Div Trp:			
HHC -----	0	44	0
1-21 Cav -----	42	126	48
*** -----	***	***	***
Total Div Trp -----	42	930	246
20th Inf DISCOM:			
HHC & Band -----	0	19	0
*** -----	***	***	***
Total DISCOM -----	0	297	62
20th Inf Div Total -----	122	3,835	767

Table D-4. Available Crossing Means

	Recon boats 3-man	Aslt boats 15-man	Foot brg	LTR (C1 12)	M4T6	Mbl fltg aslt brg/ferry
HHC/Inf Bde (3) - - - -	3					
HHC/20th Engr - - - -	4					
A-D/20th Engr - - - -	12					
E/20th Engr - - - - -	12	18	- - - - -	2	- - - - -	1-149 meter brg or 4-6 unit ferries
Brig Co/61st Engr Gp - - - - -	10	70	144 meters	6	216 meters brg or 10-4 float rafts or combi- nation	
TOTALS - - - - -	41	88	144 meters	8	216 meters brg or 10-4 float rafts or combi- nation	1-149 meter brg or 4-6 unit ferries

Table D-5. Estimated Vehicle-Crossing Capability

Alter- native	Crossing means	Cumulative vehicles crossed																
		H+1	H+2	H+3	H+4	H+5	H+6	H+7	H+8	H+9	H+10	H+11	H+12	H+13	***	H+24	H+25	
A	8-LTR (cl 12): Total round trips	0	28	84	140	196	252	308	364	420	476	532	588	644	***	1,260	1,316	
	10-M4T6 rafts (cl 55): Total round trips	0	0	0	70	140	210	280	350	420	490	560	630	700	***	1,470	1,540	
	4-Mobile floating aslt ferries (cl 60): Total cl 60 vehicles	0	0	56	112	168	224	280	336	392	448	504	560	616	***	1,232	1,288	
	0-M4T6 bridges: Total number of vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	***	0	0	
	Total vehicles - - - - -	0	28	140	322	504	686	868	1,050	1,232	1,414	1,596	1,778	1,960	***	3,962	4,144	
B	8-LTR - - - - -	0	28	84	140	196	252	308	364	420	476	532	588	644	***			
	5-M4T6 rafts - - - - -	0	0	0	35	70	105	140	175	210	245	280	315	350	***			
	4-Mobile floating aslt ferries -	0	0	56	112	168	224	280	336	392	448	504	560	616	***			
	1-M4T6 bridge - - - - -	0	0	0	0	0	0	400	800	1,200	1,600	2,000	2,400	2,800	***			
	Total vehicles - - - - -	0	28	140	287	434	581	1,128	1,675	2,222	2,769	3,316	3,863	4,410	***			
C	8-LTR - - - - -	0	28	84	140	196	252	308	364	420	476	***						
	0-M4T6 rafts - - - - -	0	0	0	0	0	0	0	0	0	0	***						
	4-Mobile floating aslt ferries -	0	0	56	112	168	224	280	336	392	448	***						
	2-M4T6 bridges - - - - -	0	0	0	0	0	0	800	1600	2400	3200	***						
	Total vehicles - - - - -	0	28	140	252	364	476	1,388	2,300	3,212	4,124	***						

Essential vehicles are those considered most important to the success of the operation for the assistance that they or their contents can provide for the assault force on the far bank. Examples are shown below.

Armored vehicles
Engineer equipment for far-bank tasks
Ammunition carriers
Weapons carriers
Artillery forward observer vehicles
Forward air control party vehicles
Medical vehicles
Air defense vehicles
Field artillery vehicles
Smoke generator vehicles
Communication vehicles
Military police traffic control vehicles

Because rafts are likely to be the only available means to cross the essential vehicles, they should be constructed as early as possible. However, employing men and equipment on the construction of rafts (except mobile assault bridge ferries) may retard the building of bridges. In addition, rafts generally cannot cross a sufficient volume of combat, combat support, and combat service support vehicles at an acceptable rate for sustained operations. Rafts must be replaced or supplemented by bridging when enemy observation or reaction has been reduced.

In light of the above, the following rationale was used in selecting the optimum alternative from those shown in table D-5:

Alternative A was rejected. Although the use of all equipment for rafting gives the division a large initial volume of heavy vehicles across the river, the lack of any bridging prevents the division from getting a maximum number of vehicles across in an acceptable time period.

Alternative B was rejected: It allows the division maximum essential vehicles in the bridgehead early in the operation. It also provides a bridge that allows the division to cross a sufficient volume to accomplish its mission. However, the success of the operation now depends on the ability to prevent the enemy from destroying this one bridge. In addition, the difficulty in controlling the traffic through this "defile" so as not to present a nuclear/chemical target would be great.

In this particular example, alternative C was selected as the basis for the crossing plan. Alternative C provides sufficient essential vehicles in the bridgehead early in the operation and also allows the extra advantage of one additional bridge. By using this alternative, the division gains flexibility. If one bridge is destroyed, traffic can be rerouted over the second bridge.

The crossing plan contained in the following sample operation order is based on the data developed in the preceding paragraphs.

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20th Inf Div
JONESBORO (RC3132), AGSATLAND
141130Z July 19_____
CL 523

OPORD 5

Reference: * * *Time Zone Used Throughout the Order: ZULU.Task Organization:

1st Bde

- 1-66 Inf
- 1-67 Inf
- 1-68 Inf
- 1-76 Mech (-)
 - A/1-1 Armor
- 63d Arty Gp (DS)
 - 1-45 FA
 - 1st Bn (155, Towed), 651st FA
 - 1st Bn (155, Towed), 652d FA
 - A/1-439 ADA (DS)
- 321st Cml Co (Smoke Genr) (Spt)
- A/20th Engr (DS)

2d Bde

- 1-69 Inf
- 1-70 Inf
- 1-71 Inf
- A/1-76 Mech
- 1-46 FA (DS)
- 322d Cml Co (Smoke Genr) (Spt)
- B/20th Engr (DS)

3d Bde

- 1-72 Inf
- 1-73 Inf
- 1-1 Armor (-)

Div Arty

- 1-47 FA
- 1-48 FA
- 1-49 FA
- 1st Plt, Btry A (Slt), 191st FA
- 2d Bn (8, SP), 606th FA
- 1st Bn (155, Towed), 653d FA

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(Classification)

Div Trp

1-21 Cav
 2d Sqdn, 201st Armd Cav Regt (Reinf)
 1-439 ADA Bn-Gp
 1-439 ADA (C/V)
 1st Bn (Hawk, SP), 458th ADA
 20th Avn +
 110th Avn Bn (Cbt)
 20th Engr
 61st Engr Gp (Cbt)
 235th MI Co (Div)
 287th ASA Co (Div Spt)
 20th MP Co
 1st Plt, 270th MP Co
 20th Sig
 240th CA Co

DISCOM

20th Admin
 20th Maint
 20th Med
 20th S&T

- * * * * *
- c. Attachments and Detachments. (Attachments effective 151200 July.)
- (1) 2/201st Armd Cav Regt (Reinf).
 - (2) 63d Arty Gp:
 - 2-606 FA
 - 1-651 FA
 - 1-652 FA
 - 1-653 FA
 - (3) 1/A/191 FA.
 - (4) 1-458 ADA.
 - (5) 235th MI Co (Div) (remains atch).
 - (6) 287th ASA Co (remains atch).
 - (7) 110th Avn (Cbt):
 - 161st Avn Co (Aslt Spt Hel)
 - 183d Avn Co (Aslt Hel)
 - 184th Avn Co (Aslt Hel)
 - 185th Avn Co (Aslt Hel)
 - 195th Avn Co (Atk Hel)
 - (8) 321st Cml Co (Smoke Genr).
 - (9) 322d Cml Co (Smoke Genr).

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(Classification)

- (10) 61st Engr Gp (Cbt):
 501st Engr Bn (Cbt)
 502d Engr Bn (Cbt)
 503d Engr Bn (Cbt)
 5006th Engr Co (Dptrk)
 5030th Engr Co (Pnl Brg)
 5050th Engr Co (Fltbrg)
 5051st Engr Co (Fltbrg)
 5080th Engr Co (LE)

(11) 1/270th MP Co (Corps).

(12) 240th CA Co (remains atch).

2. MISSION

Division attacks across RED River 180330 July to secure high ground from Hill 776 (RC2834) to Hill 892 (RC3540) (line GEORGE) and corps bridgehead (line ALBERT) in zone and prepares to continue to attack to the north.

3. EXECUTION

a. Concept of Operation. Annex B, Operation Overlay. (fig. D-1.) The attack will be executed in two phases. Assault boats and helicopters will make initial assault crossings under concealment of darkness. 1st Bde makes main attack on the west; 2d Bde, on the east; 3d Bde, in reserve.

(1) Maneuver.

(a) Phase I. Reconnaissance and demolition teams cross the river at 180230 July to breach obstacles and improve exits for the assault elements. 1st Bde and 2d Bde move from present locations to begin crossing simultaneously at 0330 hours by assault boat. 1st Bde secures crossing sites and continues to secure objective 1 by airmobile assault. 2d Bde secures crossing sites and objective 2.

(b) Phase II. On order, 1st Bde and 2d Bde continue attack to the north. 1st Bde secures line ALBERT in zone by airmobile and ground assault. 2d Bde secures line ALBERT in zone by ground assault. 1st Bde and 2d Bde prepare to continue to attack to the north on order.

(2) Fires. Annex D, Fire Support.

(a) Field artillery. A 20-minute nonnuclear preparation will be fired starting at 180320 July during phase I to neutralize enemy forces north of the river and to cover the crossings of the assault infantry battalions. Priority of fires during phases I and II to 1st Bde; to 3d Bde, when committed. Appendix 1, Field Artillery Fire Support, to Annex D, Fire Support.

(b) Nuclear. Nuclear fires will be planned to block enemy avenues of approach from the north and northwest and to destroy or neutralize fortifications that hinder rapid movement of the brigades. Appendix 2,

(Classification)

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Air Fire Support, and Appendix 3, Nuclear Fire Support, to Annex D, Fire Support.

(c) Air. During phase I, aircraft will fly close air support missions near objectives 1 and 2. Priority to 1st Bde; to 3d Bde, when committed. Aircraft will suppress ground fire for all helicopter movements. Appendix 3, Air Fire Support, to Annex D, Fire Support.

(d) Chemical. Nonpersistent chemicals will be fired as part of the field artillery preparation in phase I. Persistent and nonpersistent lethal chemicals will be fired to supplement effects against fortifications and movement of enemy reserve. Appendix 4, Chemical, to Annex D, Fire Support.

b. 1st Bde:

(1) Phase I.

(a) Conduct assault crossings at crossing sites a, b, c, and d, Annex E, Crossing.

(b) Secure objective 1 by airmobile assault.

(2) Phase II.

(a) On order, secure line ALBERT in zone.

(b) Be prepared to continue the attack to the north.

c. 2d Bde:

(1) Phase I. Conduct assault crossings at crossing sites e, f, g, h, and i, Annex E, Crossing.

(2) Phase II.

(a) On order, secure line ALBERT in zone.

(b) Be prepared to continue the attack to the north.

d. 1-21 Cav:

(1) Cross in zone of 1st Bde.

(2) Protect division west (left) flank.

e. 2/201st Armd Cav Regt:

(1) Cross in zone of 2d Bde.

(2) Protect division east (right) flank.

f. Arty:

(1) FA.

(a) 1-45 FA : atch 63d Arty Gp.

(b) 1-46 FA : DS 2d Bde.

(c) 1-47 FA : GSR 63d Arty Gp, on order, DS 3d Bde.

(d) 1-48 FA : GS.

(Classification)

(Classification)

- (e) 1-49 FA: GS.
- (f) 63d Arty Gp: DS 1st Bde.
 - 1-45 FA
 - 1-651 FA
 - 1-652 FA
- (g) 1/A/191 FA: GS.
- (h) 2-606 FA: GS.
- (i) 1-653 FA: reinf 1-46 FA.
- (2) ADA.
 - (a) 1-439 ADA Bn: form 1-439 ADA Bn-Gp.
 - (b) 1-439 ADA Bn-Gp: GS.
 - 1-439 ADA Bn
 - 1-458 ADA Bn
 - A/1-439 ADA; DS 1st Bde
 - (c) Protect in priority.
 - 1. Before 180330 July: engineer equipment parks.
 - 2. Phase I: assault crossing sites, raft sites, and bridge sites.
 - 3. Phase II: bridges and crossing sites.
- (3) Annex C, Air Defense.
- (4) Annex D, Fire Support.
- g. 20th Avn ±:
 - (1) Phase I. Support 1st Bde in securing objective 1 by providing lift for three inf co. Prepare to support 61st Engr Gp with 161st Avn Co to move raft components to crossing sites.
 - (2) Phase II. Support 1st Bde in securing line ALBERT in zone by providing lift for three inf co.
 - (3) Prepare to support division reserve by airlifting one inf bn.
 - (4) Annex F, Aviation.
- h. 20th Engr:
 - (1) Construct and operate two MAB rafts and one light tactical raft in each brigade zone.
 - (2) Prepare to provide one company DS to 3d Bde when committed.
 - (3) Annex G, Engineer.
- i. 61st Engr Gp:
 - (1) Construct and operate M4T6 rafts in division zone.
 - (2) Construct bridge at site ECHO and at site QUEBEC.

(Classification)

(Classification)

(3) Provide assault equipment sections for assault boat support at crossing sites e, f, g, h, and i.

(4) Provide assault equipment sections for assault boat support at crossing sites a, b, c, and d.

(5) Annex G, Engineer.

j. DISCOM: on order, move to vicinity of RC3038.

k. Res:

(1) 3d Bde:

(a) Cross RED River in zone of 1st Bde; follow in zone of 1st Bde.

(b) Prepare to assume mission of 1st Bde or 2d Bde: priority in phases I and II to 1st Bde.

(c) Prepare one battalion-size force for commitment by helicopter on 1 hour's notice, priority in (b) above.

(2) One 8-in how/MRC/2 KT

One HJ/FFR/5 KT

One HJ/FFR/10 KT

i. Coordinating Instructions.

(1) Annex H, Smoke.

(2) Annex I, Surface Movement.

(3) Notification of postponement of assault crossing because of weather will be issued NLT 180200 July.

(4) Brigades submit air movement plans to the G3 for approval NLT 161700 July.

(5) Troop safety: negligible risk to warned, exposed personnel.

4. SERVICE SUPPORT

Annex J, Service Support.

5. COMMAND AND SIGNAL

Annex K, Communications-Electronics. Current index to CE01. Acknowledge.

DRUM
MG

OFFICIAL:

/s/ Pontiac
PONTIAC
G3

Annexes: A—Intelligence (omitted)
B—Operation Overlay

(Classification)

(Classification)

C—Air Defense (omitted)
D—Fire Support (omitted)
E—Crossing
F—Aviation (omitted)
G—Engineer (omitted)
H—Smoke (omitted)
I—Surface Movement (omitted)
J—Service Support (omitted)
K—Communications-Electronics (omitted)
L—Electronic Warfare (omitted).

Distribution: A

63d Arty Gp
2/201st Armd Cav Regt
110th Avn Bn

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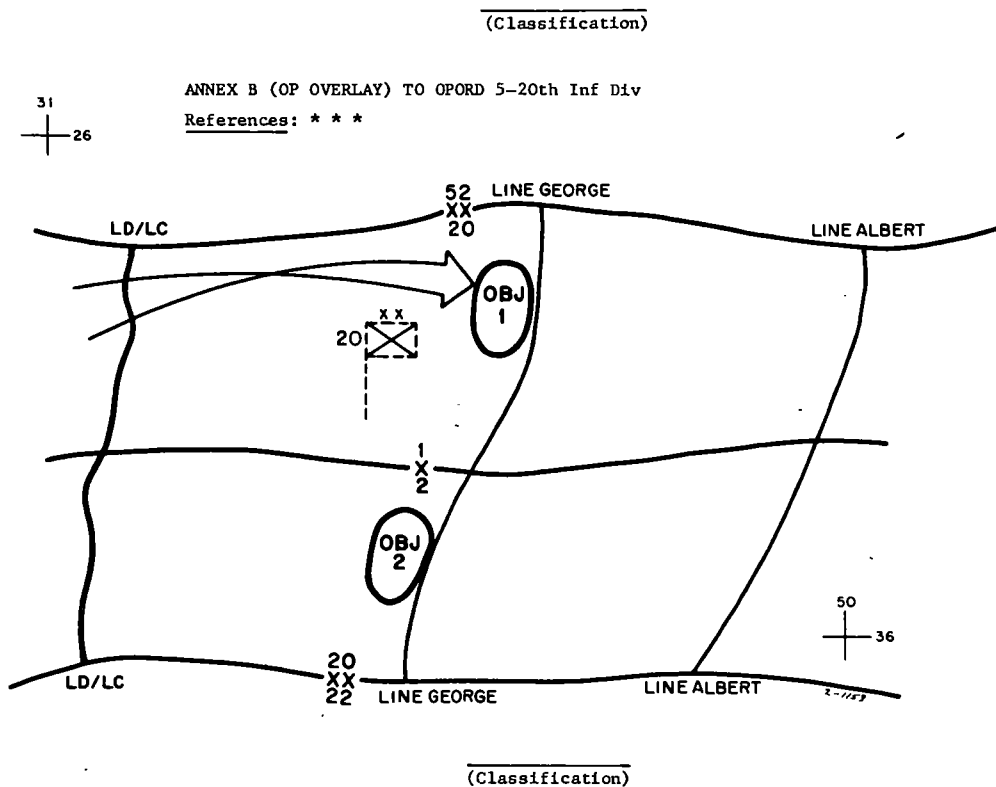


Figure D-1. Annex B (Op Overlay) to OPORD 5.

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* * * * *

ANNEX E (CROSSING) TO OPORD 5—20th Inf Div

1. CROSSING SITE AND CROSSING AREA LOCATIONS

Appendix 1, Crossing Overlay (fig D-2).

2. ASSAULT CROSSING SITESa. 1st Bde.

(1) Crossing area OREGON: assault crossing sites a and b.

(2) Crossing area VERMONT: assault crossing sites c and d.

b. 2d Bde.

(1) Crossing area TEXAS: assault crossing sites e and f.

(2) Crossing area FLORIDA: assault crossing sites g, h, and i.

c. 1st Sqdn, 21st Cav. Crossing area OREGON; assault crossing site a, on order.d. 2d Sqdn, 201st Armd Cav Regt. Crossing area FLORIDA; assault crossing sites g and i, on order.3. RAFT SITES

Type and capacity of LTR's and mobile assault bridge ferries and priority of crossing. Appendix 2, Raft Data and Priority of Crossing.

4. FLOATING BRIDGES

a. Type and capacity of bridges in 20th Inf Div zone:

Crossing area	Site	Type of bridge	C 1	Approx opening time
OREGON	ECHO	M4T6	45/55	H+6
TEXAS	QUEBEC	M4T6	45/55	H+6

b. Tentative priority of crossings:

(1) Site ECHO.

H+6 to H+6 hr 15 min	Div Trp
H+6 hr 15 min to H+8 hr 15 min	1st Bde
H+8 hr 15 min to H+9 hr 45 min	Div Arty
H+9 hr 45 min to H+10	3d Bde
H+10 to H+11	DISCOM

(2) Site QUEBEC.

H+6 to H+6 hr 15 min	Div Trp
H+6 hr 15 min to H+7 hr	2d Bde
H+7 hr to H+10	Div Arty
H+10 to H+11	Div Trp

5. CONTROL OF CROSSING

a. Brigades executing assault crossings control movement across river

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(Classification)

within their zone until crossing areas are established. Crossing areas established on division order.

b. The following officers are designated crossing area commanders for the indicated areas:

Crossing area	Commander	CP location
OREGON	BG BLACK, Asst Div Comdr, 20th Inf Div	RC285354
VERMONT	LTC GREEN, XO, 3d Bde, 20th Inf Div	RC312353
TEXAS	BG BLUE, Asst Div Comdr, 20th Inf Div	RC335352
FLORIDA	LTC BROWN, Div HHC, 20th Inf Div	RC352351

c. All raft and bridge crossings priorities will be adjusted based on actual opening times of rafts and bridges.

d. Annex I (Surface Movement) (omitted).

Appendixes: 1—Crossing Overlay

2—Raft Data and Priority of Crossing

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APPENDIX 1 (CROSSING OVERLAY) TO
ANNEX E (CROSSING) TO OPORD 5-

References: * * *

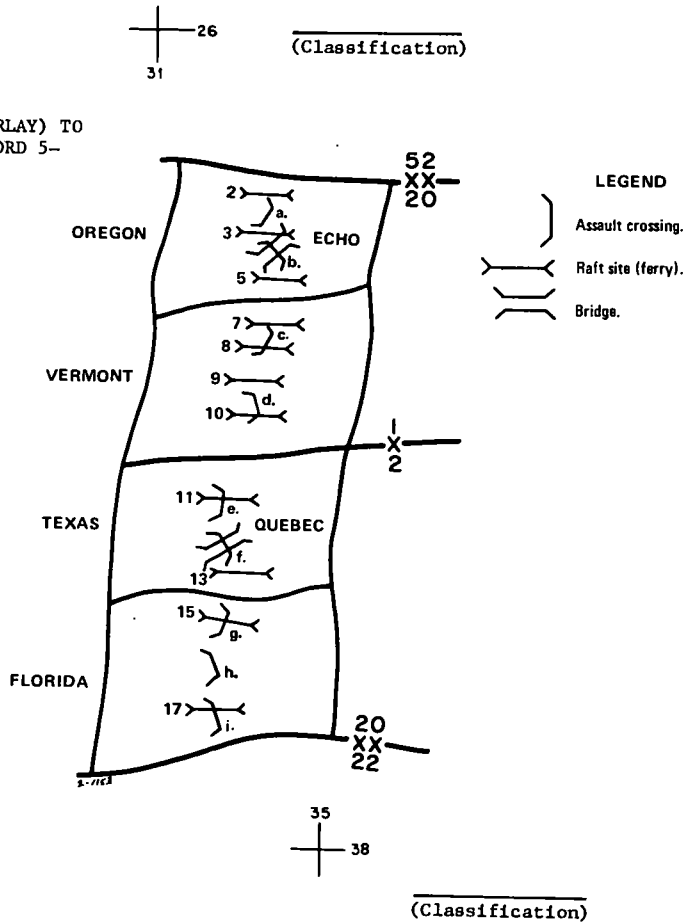


Figure D-2. Appendix 1 (Crossing Overlay) to Annex E (Crossing) to OPORD 5.

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APPENDIX 2 (RAFT DATA AND PRIORITY OF CROSSING) TO
ANNEX E (CROSSING) TO OPOD 5—20th Inf Div1. Type and capacity of LTR's and mobile assault bridge ferries in zone
of 1st Bde.

Crossing area	Site	No and type of raft	Opening time (approx)	Round trips ca hr per raft (day)	Capacity per hr (day) tk gp veh		Capacity per hr (night) tk gp veh	
OREGON	2	1 LTR	H+1 hr 30 min	7	--	7	--	3
	3	1 mbl fltg aslt	H+2 hr	7	14	(28)	7	(14)
	5	2 LTR	H+1 hr 30 min	7	--	14	--	6
	TOTAL capacity per hr, mbl aslt brg ferry				14	(28)	7	(14)
	TOTAL capacity per hr, LTR				--	21	--	9
VERMONT	7	1 mbl fltg aslt	H+2 hr	7	14	(28)	7	(14)
	8	1 LTR	H+1 hr 30 min	7	--	7	--	3
	9	1 LTR	H+1 hr 30 min	7	--	7	--	3
	10	1 LTR	H+1 hr 30 min	7	--	7	--	3
	TOTAL capacity per hr, mbl aslt brg ferry				14	(28)	7	(14)
TOTAL capacity per hr, LTR				--	21	--	9	

2. Type and capacity of LTR's and mobile assault bridge ferries in zone
of 2d Bde.

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Crossing area	Site	No and type of raft	Opening time (approx)	Round trips ea hr per raft (day)	Capacity per hr (day) tk gp veh	Capacity per hr (night) tk gp veh		
TEXAS	11	1 mbl	H+2 hr	7	14 (28)	7	14	
		aslt						
	13	1 LTR	H+1 hr	7	14 (28)	--	3	
			30 min					
TOTAL capacity per hr, LTR					--	14	--	3
TOTAL capacity per hr, mbl					14	(28)	7	(14)
aslt brg ferry								
FLORIDA	15	2 LTR	H+1 hr	7	14	28	--	6
			30 min					
	17	2 mbl	H+2 hr	7	14 (28)	--	(14)	
		aslt						
TOTAL capacity per hr, mbl					14	(28)	7	(14)
aslt brg ferry								
TOTAL capacity per hr, LTR					--	14	--	6

NOTE: Figures in parentheses indicate veh capability when heavy rafts are not being used for tks or special vehs.

3. Tentative priority of raft sites. Bde plan crossing of DS arty.

Site	Time period	Unit
2	H+1 hr 30 min -H+6	1st Bde
	H+6 -H+11	Div Trp (1-21 Cav)
3	H+2 -H+5	1st Bde
	H+5 -H+11	Div Trp
5	H+1 hr 30 min -H+9	1st Bde
	H+9 -H+11	DISCOM
7	H+2 -H+9	1st Bde
	H+9 -H+11	DISCOM
8	H+1 hr 30 min -H+9	1st Bde
	H+9 -H+11	Div Trp
9	H+2 hr 30 min -H+4	1st Bde
	H+4 -H+11	Div Arty
10	H+1 hr 30 min -H+11	Div Arty
11	H+1 hr 30 min -H+9	2d Bde
	H+9 -H+11	Div Arty
13	H+1 hr 30 min -H+5	2d Bde
	H+5 -H+11	
15	H+2 hr 30 min -H+5	2d Bde
	H+5 -H+11	Div Arty
17	H+1 hr -H+4	2d Bde
	H+4 -H+11	2/201 Armd Cav
		Regt

(Classification)



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